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## THE SEA-ROUTE TO SIBERIA.*

By Dr. FRIDTJOF NANSEN, G.C.V.O., and JONAS LIED.

### I. The Voyage. By Jonas Lied.

The subject of my paper is really "The Kara Sea Route to Siberia," but in order to let my audience better understand the possibilities and importance of this subject, I shall, with your kind permission, make a few remarks on Siberia in general.

The great development that has taken place in Siberia during the last ten or fifteen years is, of course, for the greatest part, due to the opening of the Siberian railway. This railway traverses Russia and Siberia in almost a straight line from the Baltic sea to the Pacific, and is approximately 6000 miles in length with eight hundred stations. This is about twice the length of the Canadian Pacific railway from the Pacific to the Atlantic coast. Compared with even the best European railways, the rolling stock and service of the express trains are very good. It takes nine days to cover the distance from St. Petersburg to Vladivostok.

My time here this evening would be too short to deal in detail with the whole of Siberia, and therefore I shall confine myself mainly to Central Siberia—the district around the Obi and Yenisei rivers. Central Siberia plays a most important *rôle* in the problem of opening up the northern sea route. It will be seen from the map that that part is situated disadvantageously in regard to an outlet for produce. The distance either way to the Baltic, as well as to the Pacific, is approximately 3000 miles, which has to be covered for the greatest part by railway. Naturally,

* Royal Geographical Society, February 23, 1914. Map, p. 604.

railway transport over such a stretch is very expensive, and this is the reason for the northern sea route having been taken up again.

The means of communication in Central Siberia become very primitive if you depart from the railway line. The natural means of communication are, of course, the rivers which nearly all run parallel from the south to the north, and the traffic goes by river boats. On the Obi there are more than 100 steamers of various sizes, and the Yenisei has about 30. Navigation is kept up during more than five months of the summer right from the mouth as far as above Minussinsk on the Yenisei, and on the Obi from the mouth to Biisk.

The Yenisei river is the fifth longest river in the world, with a length of about 2900 miles. It is very rarely narrower than half a mile, and at the mouth, for a distance of about 300 miles, it varies in width from 10 to 30 miles. At Krasnoyarsk the current has an average speed of about 4 miles an hour.

On the lower reaches the goods are transported in barges towed by tugs. From the upper parts of the river, rafts are sent down simply drifting with the current. There is a kind of barge which is used for drifting purposes, and these are usually sent from the more cultivated districts on the upper part of the river loaded with various necessaries of life and broken up at their destination, which is north of the tree-boundary. The material thus obtained is used for the erection of houses. At the mouth of these two rivers, several villages are built entirely of such material. Before the frost comes on, the steamers are brought into a kind of harbour where they freeze in. If repairs are necessary, they are simply lifted out by jacks and put on the ice and treated as though they were in dry dock. In the winter, in the southern parts, transport is done by horse and sledge. Very often caravans of several hundred horses may be seen going to the mining districts. The ordinary troika really means treble, *i.e.* is drawn by three horses. The average speed of such a troika is about 7 miles an hour, changing of horses included. It is not a very smart turnout, but it is in accordance with the requirements of the country. In the northern parts, reindeer and also dogs are employed. The people belong to various races. In the south are to be found Tartars, round the railway line you have the Siberians and Russians, who are very much alike. Then, further down the river you meet the Tungus, the Uraks, the Ostiaks, and the Dolgans.

Of all industries in Central Siberia, mining is the oldest. In the Yeniseisk district about thirty gold-dredgers are employed. Coal is also found in large quantities, and there is a pit-head of a mine near Minussinsk.

The greatest resource of this part of the country is, of course, agriculture, and in this direction lies the future of Siberia. Fifteen years ago comparatively little was done on the part of the Government in regard to colonization, but to-day the position is quite different. An army of

officials is in the field preparing and allotting ground for the emigrant. During each of the last two years, about 300,000 have come into Siberia, and it is calculated that about 10 per cent. have returned, and still the emigration is increasing steadily. The population in Siberia is at present about 13,000,000, and it is almost safe to say that it should be doubled during the next fifteen or twenty years. At present a settler receives about 45 acres of free land and is helped by the Government to necessary capital for building houses and to agricultural machinery from the Government stores situated in various towns. The most important agricultural centre on the Yenisei is Minussinsk. In a good year, the district round Minussinsk can export at present half a million quarters of grain, mostly wheat and rye. Besides grain, pretty large quantities of hemp and flax are raised. Very important articles are hides and skins.

A rather amusing article is the horns of the so-called wild maral deer. It is kept in captivity exclusively for the horns, which are cut every year and sent to China, where they are used for a life elixir. The horns are worth about 40*s*. per pound, and a deer in captivity is worth about £50.

In the summer time at the mouth, about 4000 people are employed for the fisheries. The people come from the south and remain during the summer time, drawing their nets all day and salting the fish as they catch it. In the autumn, the steamers come and take away the salted fish and the people, including all their gear.

The fur trade is of course an important item in Central Siberia, and a very large part of the furs is obtained by bartering. In Yeniseisk, which lies 240 miles north of the railway line, the traders concentrate about June to dispose of the furs gathered during the preceding winter. They come in the so-called elimkas, a wooden craft sometimes furnished with a big sail and drifting with the current. Such a small elimka sometimes contains, on arrival at Yeniseisk, furs to a value of £20,000. The turn-over in furs in the Yeniseisk province is very large. Two years ago, one merchant alone collected over one million squirrels.

The Yeniseisk district has very valuable forests, composed principally of the so-called Siberian cedar. Then there is pine and larch. The territory watered by the river Yenisei and its tributaries is five times the area of Germany. Enormous stretches are covered with valuable forest. There has never been any export on a scale worth mentioning, and certainly not to foreign countries. There are saw-mills in the big centres supplying local needs. The only really big customer for timber at present is the fire, which is responsible for a lot. Every year big fires occur, and in some cases it is so bad that the smoke on the rivers delay steamers for hours. The best timber is to be found north of the railway line, and, therefore, if no other means of transport are established, the timber would have to be transported against the current, a very expensive matter, before the railway

could get hold of it, and on top of that would come the expensive railway freight to Europe or to the Pacific.

I wish to say a little about the ill-reputed Siberian climate. I have spent all seasons in Siberia, and have made journeys by open sledge in the winter, spending day and night in the sledge for as long as a week at a time, only being inside houses while changing horses. I am bound to say that I feel, if anything, better out there than I do in Europe. The much-feared Siberian cold is not so bad as one really thinks, because the air is always very dry, and, besides, it is only during the months of December and January that the temperature during a few days may go down to 40° Fahr. In the north, of course, at Dudinka, situated about 400 miles from the mouth of the river Yenisei, they experience a very low temperature and also terrific winds. The wind may sometimes have a speed of 110 feet a second, and this is of course very trying when one considers that a speed of 50 feet is a storm. In such high winds, however, the temperature is never below 20° Fahr. It is true that at the frost pole, Verkhoyansk, the temperature falls to 75° Fahr. below zero, but that part of the country is not inhabited in the winter. In the southern part of central Siberia, I should call the average winter temperature 5° Fahr. below freezing-point and this is quite bearable. In the summer, it gets pretty hot in the southern part of Siberia, and 105° Fahr. above zero may be experienced, but again the heat is less felt because of the air being so dry.

I shall now tell you of the attempt made last year to re-open the much-discussed sea route to Siberia by way of the Arctic ocean. It would be a mistake to believe that this attempt is the first of its kind. There are pretty detailed reports of previous attempts, made as early as 1553, when Sir Hugh Willoughby made his expedition with three ships. Subsequent expeditions were made in 1556 and 1580 by Englishmen, and in 1594, 1595, 1596 by Dutchmen, with whom was William Barents; the first of these expeditions only reached the west coast of Yamal and returned.

In 1610 and 1612 the Dutch again tried, but without much success. Another expedition left Archangel in 1616, and reached the Baidaratskaia Guba, and one in 1625 actually entered the Kara sea. There was then a Danish expedition in 1653, a Dutch in 1664, and an English in 1676, but these were mainly whaling expeditions. They all had the intention of finding a way to India and China, but only got into the Kara sea, and had to return. With the exception of a Russian expedition in 1690, which came to grief and had to winter on the Yamal coast, where eleven of them died from scurvy, there was a pause until 1733, when a series of expeditions again started. It would take too much time to give an account of all the expeditions—including the memorable circumnavigation of Baron Nordenskjöld in 1878–9—that were made in the course of the following years. But I must refer to 1874, when the English captain Wiggins made his expedition in the steamer *Diana*, and successfully reached the bay of the river Obi, and in 1876 entered the mouth of the

SIBERIAN TYPES.



CLIFF BETWEEN KRASNOYARSK AND MINUSSINSK.



FOREST ON YENISEI, NORTH OF KRASNOYARSK.

MINUSSINSK.

TUNDRA, MOUTH OF YENISEI.

CARAVAN OF STEAMERS, 680 MILES FROM MOUTH OF YENISEI.

Yenisei. After that Wiggins made several expeditions, and other nations followed. But Nordenskjöld in 1875 actually landed in Dickson harbour and travelled up the Yenisei. However, the most serious attempt on commercial lines was made by the Englishman, Mr. Francis Leybourne Popham, who kept up the route for several years. At the time no duty had to be paid on goods brought that way, but as the duty was again introduced in 1899, Popham ceased operations.

In 1900 Baron Toll made his scientific expedition and successfully passed the Kara sea, but he himself perished at Bennett island, and his ship was abandoned not very far from the Lena river. From 1900 to 1905 no serious attempt was made, but in 1905, during the war between Russia and Japan, an expedition was undertaken by the Russian Government in order to relieve the traffic on the Siberian railway. This expedition consisted of twenty-two ships, chartered in Germany and England. They arrived at the mouth of the Yenisei at the beginning of September, 1905, having taken three weeks from the Murman coast. In the same year another successful expedition was made with two steamers from Hamburg arriving at the mouth of the Obi, where a general cargo was discharged. In 1911, Captain Webster successfully reached the mouth of the Yenisei in the SS. *Nimrod*, which he bought from Sir Ernest Shackleton. As far as the record of the Russian Traffic Ministry goes, about 150 ships in all made the voyage to the Obi and the Yenisei rivers, and of these approximately 80 per cent. arrived at their destination, while the others, mostly owing to an insufficient knowledge of the conditions, had to return. Of the total about 7 per cent. suffered damage or loss, but again this must be partly put down to insufficient knowledge of the waters. From 1887 to 1898 slightly more than 100,000 tons of goods were brought into Siberia by that way from Europe and elsewhere.

In 1912 a small steamer was sent by the Siberian Company, of which I am the managing director, but, owing to the captain returning at too early a date and partly because of the exceptional conditions in the Arctic that year, the boat returned without reaching the Yenisei, but also without suffering any damage in the least. Last year, that is, in 1913, the same company made another expedition with the SS. *Correct*, a Norwegian steamship of 1550 tons dead weight, and it is about this that I wish to tell you.

The *Correct* was an ordinary cargo boat, with a draft of 17 feet. It had the bow protected against the ice by a covering of oak planks, extending 4 feet under the water and 2 feet above. At the beginning of July it left Newcastle-on-Tyne, and proceeded to Stettin in Germany, where the bulk of the cargo was taken in. It arrived at Tromsoe in the north of Norway at the beginning of August. Besides the captain of the boat, Samuelsen, there were Mr. Vostrotin, a Siberian member of the Russian Parliament, Dr. Nansen, Mr. Loris-Melikoff, the secretary of the Russian Legation in Kristiania, and myself. Nansen, Mr. Vostrotin, and Mr. Loris-Melikoff

came with us as passengers. We all joined the boat at Tromsoe and sailed on August 5, making straight for the Kara strait. We were outside the strait on the 10th, and, seeing no ice, went through. We were surprised to see that there was no ice. We had thought we should be compelled to make our passage through the Yugor strait, situated more to the south, and almost invariably, this southern strait had been used by previous expeditions. When effecting our passage through the strait we were taken out of our course by a terrific current running out from the Kara sea. In one place it must have had a speed of fully 8 miles an hour.

Our steamer was fitted with wireless, having a sending range of 200 nautical miles. Before leaving Norway we made an arrangement with the Russian Postmaster-General to be on duty during certain hours of the nights so that we might communicate with the three wireless stations, then in course of erection at Yugor strait, Vaigach, and Mare Sale. These stations were not to be opened for general service before 1914, but the postmaster courteously granted us a right to communicate with them last year in case they could be made ready while our expedition was going on. However, on our voyage out all attempts to obtain a connection were useless, and we took it that they had not been successful in completing the stations for service.

After going through the Kara strait we set course for White island, also called Bielyi; but in the evening we met the first ice, and had to slow down. There was nothing for it, the experts had to be called in, and Nansen took to the crow's nest. It soon became evident that we could not continue our course, and it was decided to steer south. The course was altered several times during the day of the 11th, as on our port side we had impenetrable ice-flows. Early in the morning of the 12th we pressed our way between the floes, which had now become more scattered, and sighted what turned out to be Cape Mare Sale. The main difficulty of the route has always been considered the passage across the Baidaratskaia Guba, and therefore we were very satisfied when we saw the coast on the other side, although we could get no further that day on account of ice ahead. While waiting here for the ice to slacken, we prepared to go ashore and try to find some people. We knew that this was the site for one of the wireless stations, and we were anxious to know whether the Russian Government's steamer, which had left Archangel three weeks before, had arrived with the material and plant. We could see some native tents through our binoculars. Just as we wanted to start we saw a boat coming to us, and soon after five Samoyedes came alongside and boarded the ship. They told us that the Government equipment boat had not been seen.

The following day we went on, but during the next few days did not make much progress. The weather was very fine, and it was so warm that one could walk on deck without an overcoat. It was quite calm, unfortunately, because the least wind would have spread the ice ahead of us. Still, we made some little progress almost every day until August 21, when

we were just short of White island. On our way we saw some very interesting formations of ice. For instance, there was an iceberg, through which the current had made a tunnel large enough to allow the passage of our boat. Two days before we encountered an ice-floe, which we calculated was considerably larger than the Isle of Wight, and here we had some skiing and shooting. Here we also experienced the only really exciting incident of the voyage. In the evening we found we could get no further that day, and therefore went and made fast to an iceberg standing on the sea-bed, being about 90 feet in height. We laid our bow right against it and rowed a long rope right round it. Later in the evening the ice pilot, Captain Johannessen, who was captain with Nordenskjöld when he discovered the north-east passage more than thirty years ago, came into the saloon and quietly remarked that he considered it somewhat dangerous to remain so close to the iceberg, as he thought it might capsize. All agreed that if that should happen it would have smashed our bow, and we should probably never have arrived at the end of our journey. It was decided to move and drop anchor some distance away. Three hours afterwards the iceberg capsized with a tremendous clash. A good deal of seal was seen, and we also had some walrus shooting. On August 21, in the afternoon, Nansen had another trip to the crow's nest—he seemed very happy up there. Soon afterwards he came down and said that, judging from the colour of the horizon, he was sure there was open water some distance ahead. We made another start, and, quite right, after pressing our way through the floating ice for some little time, there was a shout from the nest that open water could now be seen. Soon we went full speed ahead and rounded Bielyi island on the 22nd. On the 23rd, in the morning we again met ice and tried to go west of Siberiakoff island, but had to come back again, meeting more ice and shallow water. The same day we took the ground on a sandbank at full speed, and ran our bow up 1½ feet above the water-line. However, we came off again in a few hours by our own exertions.

In the evening, on August 32, we dropped anchor in the harbour of Dickson island; here we were delayed a day on account of fog. We went ashore on the island to see whether any traces could be found of the Russian lieutenant Brusiloff's expedition, which left Archangel in August, 1912, to try to repeat the north-east passage and has not since been heard of. There is a depôt which was put down on Dickson island eleven years ago by the relief boat in search of the last Baron Toll's expedition, and contains stores of various kinds, such as coal, matches, tobacco, etc., now all spoilt with the exception of the coal. When I visited Dickson island last year coming from the Yenisei river, I left in the despatch box, lying under the roof of the depôt, a letter which I now found unopened, and therefore we took it for granted that nobody had been on the island since. We left another message giving an account of our presence.

We now entered the mouth of the Yenisei river, and on August 27, at

5 o'clock in the afternoon, arrived at the arranged meeting-place, Nosonofskoi Ostrof, having been twenty-two days from Tromsoe, in the north of Norway. It turned out that the river boats with our Siberian goods had arrived, after their 1500-mile river journey from the interior, at 11 o'clock in the forenoon of the same day. The captain of one of the river boats and the custom-house officials came on board, and there was a great reception with salute from all the firearms available. Soon we got the lighters alongside our steamer, and loading and discharging commenced.

On September 3 Nansen and our two Russian passengers left us for the interior in a motor boat sent by the Russian Government, whose guest Nansen was from that moment until he returned to Norway at the beginning of November.

Loading and discharging took us thirteen days, and on September 10 we commenced our return voyage, while the river steamers with the European goods commenced their long river journey back to the interior. Apart from meeting a little ice outside Dickson island, we found open water all the way. Halfway into the Kara sea we had a two days' storm, which prevented much progress being made. On September 14, at two o'clock in the morning, we heard wireless communication between the Yugor and Vaigach stations, and soon afterwards the former responded to our signal, and asked us where we were and if we wanted any assistance. We replied that we were going first-rate, and gave a message to be forwarded to Archangel reporting our progress. This was the first practical use made of the wireless stations in the Kara sea. We dropped anchor at Tromsoe on September 20, having been ten days from the Yenisei, or less than half of the time which we took out. On September 29 we landed at Immingham Dock, near Grimsby, £25,000 worth of Siberian produce, consisting of hemp, flax, skins, tallow, horsehair, grain, hides, and timber.

## II. On the Ice Conditions and the Possibility of a Regular Navigation.

**By FRIDTJOF NANSEN.**

The most important observations, which I had an opportunity of making during our voyage with the *Correct* to the mouth of the Yenisei, were in my opinion those on the currents and distribution of the ice in the Kara sea, and on the movements of this ice with the currents and the winds. The distribution of the ice in the Kara sea seemed to be much the same in August last summer as it was in the beginning of August in 1893, when I crossed this sea with the *Fram*. The ice occurred chiefly in the eastern part of the sea, northwards along the west coast of Yalmal. And especially last summer I made the observation that the ice was chiefly distributed over the shallow parts of the sea.

There are no great depths in the Kara sea, and the differences of depth

cannot be considerable. A bathymetrical chart of this region shows, however, that a marked submerged platform or shelf, with depths of between 5 and 35 fathoms, extends along the whole of the west coast of Yalmal northwards, and far westwards into the Kara sea. It was just on the edge of this submerged shelf that we met the ice on August 11, after having passed through open sea from the Kara strait. And the edge of the ice extending southwards seemed to follow very nearly the edge of the shelf, while a long open bay, extending north-eastwards into the ice, which we passed in the night between August 11 and 12, just seemed to coincide with a submarine channel penetrating into the shelf in an easterly or north-easterly direction.

We spent ten or eleven days in the ice lying over this shelf, and navigated through a great deal of it. I got the impression then, as well as in 1893, that there is remarkably little movement in this ice. It is to a great extent moved to and fro by the tidal currents, and, of course, it is also moved by the winds. But the drift of this ice is not, as a rule, very rapid. On August 17, we were stopped by an unbroken icefloe which extended from the coast of Yalmal about 20 or 25 miles north-westwards into the sea. It was hardly possible to see that the ice moved at all during two days when we were anchored near it, and there is reason to believe that this ice had been lying approximately in this same place ever since the preceding winter.

It is obvious that the movement of the water, in which the ice floats, and also the direction of the wind, must have a great effect upon the distribution of the ice in the sea. This must also be the case in the Kara sea. But it is a comparatively closed basin; there is no regular system of currents, to such an extent as some authors seem to believe. As I have already said, my observations seem to prove that the currents there to a very large extent are dependent on the tides and the wind.

But for the transport of the ice, and consequently for its distribution in the sea, the tidal currents can be of no account, as they will carry the ice along an elliptic course back to the same place after a little more than twelve hours, as I was able to prove by direct current measurement in the ice of the Polar sea in 1912. The wind, and the currents created by the wind may, however, have much influence upon the distribution of the ice, if the wind blows in the same direction for some time. The more regular circulating currents in the sea, if there are any, will also influence the distribution of the ice.

The fact is, however, that the regular sea-currents, as well as the currents created by the wind, will most easily find their way across the deep parts of the sea, while the currents move slowly over the banks and shelves and shallow parts of the sea, where the movement of the water-masses may meet great resistance caused by the unevenness or roughness of the sea-bottom, which will create vortex-movements, etc., in the water. The water-masses will, therefore, have a certain tendency to remain more

stationary over the banks and shallow parts of the sea than over its deeper regions.

In a sea covered by ice, we must therefore expect that the ice will first be carried away from those parts of the sea which are deepest, because the circulating currents will there be the strongest, and the wind will there have most power to create currents. On the other hand, the ice will have a tendency to remain over the shallow parts of the sea, where the water is most stationary, and the wind will have greater difficulty in creating currents.

That such is the case may easily be observed in the various regions of the Polar sea. Along the east coast of Greenland the Polar ice specially occurs over the shallow continental shelf, which extends southwards along the whole coast, past the Denmark straits, and the edge of the ice very nearly coincides with the edge of the continental shelf as a rule. But outside this edge the ice is comparatively early in the season carried away by the strong currents. Along the southern west coast of Spitsbergen the same thing is also observed. The ice occurs over the shelf, while the sea is generally open outside the edge of this shelf.

It is obvious that these conditions may also be of much importance for the formation of the ice. The ice will be comparatively easily formed over the shallow parts of the sea, where the water is most stationary, and the layers not so deep; the water will there be more easily cooled to low temperatures during the winter, and the ice will be less broken and carried away by wind and current than over the deep parts of the sea, where the water is more stirred by the greater movements of the water-masses, and the surface layers will not so easily be cooled to low temperatures, and where, moreover, the wind and currents will more easily break the ice and carry it away.

What is here said is evidently of much importance for the distribution of ice in the Kara sea. It seems as if the ice is most easily formed, and is growing most rapidly in the shallow parts of the sea, over the shelves near the coasts, and especially over the broad shelf off the west coast of Yalmal, while over the deeper parts of the Kara sea it is more easily broken and moved by wind and currents. This also seems to be in accordance with the experiences of several earlier expeditions. It is especially a striking fact that great masses of ice were often met with over the shelves off the whole western coast of Yalmal, and the expeditions often had great difficulties with the ice to overcome in this region before they reached the White island (Bielyi Ostrov).

The above facts may be of some importance for the navigation through these regions. As a rule, we should accordingly expect that the winter-ice is first opened and carried away from over the deep parts of the Kara sea, and if there is much ice over the shelf off the west coast of Yalmal, we might expect to find this ice most open in those regions, where submarine channels penetrate eastwards into this shelf. But, of course, this does not

prevent ice being often met with over the deepest parts of the Kara sea even late in the season, as it may easily be carried thither by the winds. I consider it possible that the ice, which often occurs over the comparatively deep sea, along the east coast of Novaya Zemlya, may to some extent have been carried there by winds and currents from the north. If ice be carried across or along a deep part of the sea, and reaches the edge of a submerged shelf or bank, it may even to some extent be stopped there or carried along the edge, because the water over the shelf is not easily moved, and offers more resistance to the drifting ice.

We might thus expect that the comparatively stationary ice, or winter ice, has a tendency to remain over the shelves and shallow parts of the sea, while the travelling ice may often occur especially in the deeper water outside the shelves.

Along the coast, open water is often formed inside the ice by the wind as soon as it blows more or less seawards, or even if it blows along the coast with the sea on the right-hand side ; because then the ice may easily be moved some distance from the land. In years when there is much ice, it may, therefore, be wise to keep along the coasts, and wait there if the ice is tight, because it must open somewhat as soon as the wind blows from the land.

It is now forty-five years since the Norwegians, in 1868 and later years, penetrated into the Kara sea in their small sailing vessel, in order to look for seal and walruses, and thus, in modern times, reopened this sea for navigation. It was in 1875 that Baron Nordenskjöld reached the mouth of the Yenisei in one of those small Norwegian sailing vessels, and the next year he and also Captain Wiggins from England went up the Yenisei with their small steamships, bringing the first cargoes. Since that time many voyages have been made through the Kara sea, though some attempts to penetrate it have failed.

If, however, we carefully study the accounts of the many voyages to and through the Kara sea, we must be struck by the fact, in how very few years the ice conditions were such as to make the passage through the sea very difficult, if the right season be chosen ; and still more, in how extremely few years we actually get the impression that a passage was impossible. But, on the other hand, the history of these many voyages prove with certainty that the distribution and quantity of the ice in the Kara sea in the summer and autumn may differ very greatly from one year to another. It may then be of great importance and interest to come to some conclusion as to the possible causes of these variations in the quantity of ice in this sea, especially as the accounts of all expeditions go to show that the ice occurring in the Kara sea, chiefly between Vaigach, Novaya Zemlya, and Yalmal, offers the only real difficulty for a regular yearly navigation between Europe and the Obi and the Yenisei.

A natural explanation of the variations in the quantity of ice, might seem to be that they are chiefly due to variations in the winds and currents,

which some years carry much ice into this sea from the north, while other years they carry ice out of it, towards the north. According to my own observations, as well as to the information I could gather from the experiences of previous expeditions, it seems to me to be obvious that the ice which is met with in the Kara sea is chiefly formed in this sea itself, and also melts there, while the ice from the Polar sea to the north is, as a rule, not carried into the Kara sea. We are consequently obliged to assume that the annual variations in the quantity of ice in the Kara sea are due to the variations in the formation and melting of the ice in this sea. It might seem possible that such variations in the formation of the ice might be caused by variations in the sea-currents, causing changes in the temperature of the sea-water. This explanation has, therefore, been proposed by some Russian authors.

In a memoir which Dr. Björn Helland-Hansen and I wrote some years ago (1909) we pointed out the probability that the variations in the temperature of the water carried by the Atlantic current into the Barents sea had an influence upon the quantity of ice formed in this sea during the following winter. And we showed that variations in the temperature in the Atlantic current off the Norwegian coast from one year to another seem to be succeeded two years later by similar variations in the quantity of ice in the Barents sea in the spring.

It might seem probable that something similar is the case in the Kara sea. But this cannot be so, as the conditions for formation of ice are totally different there from what they are in the Barents sea. The Kara sea is covered by a surface layer of water with very low salinities, similar to what we find in the North Polar sea. The low salinity of this surface-layer is caused by the admixture with the river water, and with fresh water produced by the melting of the snow and ice. The salinities of the surface-layers are much lower than those of the underlying deeper layers of water. Owing to its low salinities the surface water is, therefore, much lighter than the underlying salter water, and will remain so during the winter, even though the salinity is somewhat increased by the formation of the ice on the surface. The water of the surface layers will, therefore, remain on the top during the winter, and will more easily be cooled to its freezing point than in regions where there is less difference between the salinities of the surface layers and the underlying layers, and where, therefore, a much deeper vertical circulation of the water is created.

Such a surface-layer of less-salt water will naturally be very little influenced by the water which may be carried by the Atlantic current into the sea, because the latter water will have a much higher salinity, and therefore be so much heavier that it will flow far below the surface layers, which can only to a very small extent be intermixed with it. And besides, the water carried by the Atlantic current into the Barents sea will have to pass the long way north of Novaya Zemlya, before some little part of it may enter the Kara sea. The quantity of water which may

enter this sea through the shallow Kara strait and Yugor strait will be of no importance in this respect. The currents through these straits are, moreover, chiefly tidal currents which cannot transport any great quantity of water into the Kara sea. It will thus be understood that only a very small quantity of the water of the Atlantic current can reach the deep layers of the Kara sea, and, moreover, this water will be much intermixed with other water, and be much cooled during its long passage through the Barents sea. We cannot, therefore, expect that the variations in the temperature of this Atlantic current can have any appreciable influence on the temperature of the Kara sea.

It seems to me to be probable that the quantity of ice which each year is formed in the Kara sea, must chiefly depend on the cooling of the surface of the sea during the winter, and must also to some extent depend on the thickness of the snow, which covers the ice during the winter, because less ice will naturally be formed under a thick layer of snow than under a thin one. I think, therefore, that after a comparatively cold winter with little snow, we must expect to find a much greater quantity of ice in the Kara sea in the following spring, than after a comparatively mild winter with much snow. If the cold winter be followed by a cold spring and summer, comparatively little ice will be melted, and we shall have a very unfavourable season for navigation through the Kara sea. But, on the other hand, if a mild winter with much snow be followed by a warm summer with much sunshine, the ice will be rapidly melted, and we may expect to find a very open sea.

It may be added, that the formation of ice during the winter will also to some extent depend on the conditions of the sea during the autumn. If the Kara sea is very open and nearly free of ice in the autumn, as is sometimes the case, the formation of ice will naturally be difficult, because the wind will keep the sea rough, and as soon as new ice is formed, during some few calm days, it will very soon be broken up and crushed by the wind and the sea, and it may take some time before the formation of the ice has become sufficiently strong to check this effect of the wind. But in other years, when there is much ice in the sea in the autumn, new ice is easily formed between the floes, which keeps the sea quiet, and prevents the wind from destroying the new ice. The formation of ice can thus proceed even from the beginning of the winter without being much disturbed. A difficult year, with much ice, will therefore have consequences also for the ice-conditions in the following summer, and if two cold winters succeed each other we may expect a season which is still more unfavourable than after a single cold winter, and the opposite will be true if the winters are mild.

The correctness of this view may be tested by a comparison between the conditions of the ice in the Kara sea during each autumn with the mean temperature of the preceding winter and spring and summer in the regions near the Kara sea. A difficulty is, however, that there are

no meteorological stations near the Kara sea, where regular observations have been taken during a sufficiently long series of years. The nearest station is Karmakuli on Novaya Zemlya, but the material of observations which I have found from this station only comprises the years between 1897 and 1906. The nearest station to the south is that of Obdorsk, at the Obi river, from which station I have had a continual series of observations for the years from 1882 till 1906. The nearest station in Russia is Pustosersk, at Pechora, but from this station I have only had observations for the years between 1901 and 1906.

For each station the mean temperatures of the six winter months, from November to April, have been calculated for each winter, and also the mean temperatures for the ten months, from November one year to August the following year, the mean temperature of which months may be expected to have influence upon the condition of the ice met with in August in this sea. The values in degrees Centigrade found for Obdorsk are given in the two following tables :—

TABLE I.—MEAN TEMPERATURE OF THE WINTERS (NOVEMBER TO APRIL) AT OBDORSK.

| Winters ... ... ... | 1882–83 | 1883–84 | 1884–85 | 1885–86 | 1886–87 | 1887–88 | 1888–89 | 1889–90 |
|---|---|---|---|---|---|---|---|---|
| Temperature in degrees Centigrade ... ... | −18·6 | −19·7 | −18·9 | −19·9 | −17·3 | −22·4 | −18·2 | −15·8 |
| Winters ... ... ... | 1890–91 | 1891–92 | 1892–93 | 1893–94 | 1894–95 | 1895–96 | 1896–97 | 1897–98 |
| Temperature in degrees Centigrade ... ... | −18·9 | −20·4 | −18·8 | −18·1 | −22·3 | −19·0 | −18·8 | −20·7 |
| Winters ... ... ... | 1898–99 | 1899–1900 | 1900–01 | 1901–02 | 1902–03 | 1903–04 | 1904–05 | 1905–06 |
| Temperature in degrees Centigrade ... ... | −20·1 | −16·1 | −17·1 | −23·7 | −19·7 | −16·2 | −16·7 | −18·9 |

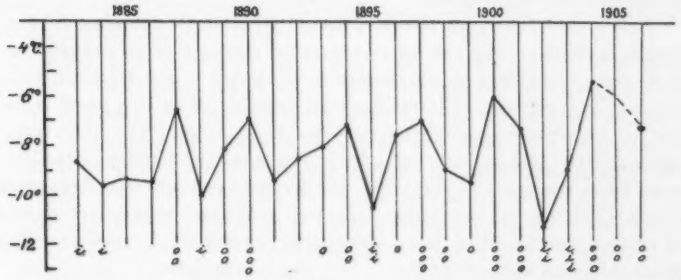
TABLE II.—MEAN TEMPERATURE OF THE TEN MONTHS FROM NOVEMBER 1ST (OF PRECEDING YEAR) TO AUGUST 31ST, AT OBDORSK.

| Years ... ... ... | 1883 | 1884 | 1885 | 1886 | 1887 | 1888 | 1889 | 1890 |
|---|---|---|---|---|---|---|---|---|
| Temperature in degrees Centigrade ... ... | −8·7 | −9·7 | −9·4 | −9·6 | −6·7 | −10·1 | −8·2 | −7·0 |
| Years ... ... ... | 1891 | 1892 | 1893 | 1894 | 1895 | 1896 | 1897 | 1898 |
| Temperature in degrees Centigrade ... ... | −9·5 | −8·6 | −8·1 | −7·3 | −10·7 | −7·7 | −7·2 | −9·1 |
| Years ... ... ... | 1899 | 1900 | 1901 | 1902 | 1903 | 1904 | 1905 | 1906 |
| Temperature in degrees Centigrade ... ... | −9·6 | −6·2 | −7·4 | −11·4 | −9·0 | −5·6 | — | −7·5 |

There was a very close agreement between the variations in the mean temperatures from year to year at all the three stations during the period when simultaneous observations were taken. We may, therefore, assume that the variations found in the temperature at Obdorsk give a fairly good indication of what the variation in the temperatures have been in the whole southern region of the Kara sea.

If now we compare the changes in the mean winter temperatures, or still better, the mean temperatures of the ten months at Obdorsk, with those in the quantity of ice met with in the Kara sea in the autumn, we find a quite remarkable agreement between them.

The curve in the diagram demonstrates the changes in the mean temperature for the ten months (November to August) of each period. The values of the temperature in degrees Centigrade below zero are given in the vertical scale to the left, the years are given in the horizontal scale above. At the foot of the figure I have tried to indicate the condition




of the ice in the autumn of each year, according to the accounts available of the various attempts made to sail through the Kara sea in the various years. One "*i*" indicates that it was not a favourable season in August and September, and much ice was met with in the Kara sea. Two *i*'s indicate that there was very much ice in the sea, and three *i*'s that the sea was full of ice. One "*o*" indicates that the Kara sea was fairly open; two *o*'s that it was very open, and three *o*'s that there was practically no ice in this sea. The years from which there were no accounts have been left blank.

The agreement between these indications and the curve in the figure is very good. The curve indicates that the mean temperatures have been low at Obdorsk, *e.g.* in 1888, in 1895, in 1902, and we find that there has been much, or even very much ice in the Kara sea. In 1903 the mean temperature at Obdorsk was also fairly low (−9·0° C.), and it succeeded the very cold year of 1902. In the autumn of 1903 there was so much ice in the Kara sea that the Russian ship *Pakhtusoff* could not penetrate into it through the straits even as late as September 14.

But, on the other hand, in those years where the curve indicates that

there has been a high temperature at Obdorsk, *e.g.* in 1887, in 1890, and still more in 1900, 1901 and 1904, we find that the Kara sea has been very open, and there was seen little ice. It seems to me that we could hardly expect a better agreement, and we may, therefore, be justified in assuming that there is a close connection between the yearly variations in the quantity of ice in the Kara sea in the autumn, and the variations in the mean air temperature of the surrounding region during the preceding winter and spring.

But, if so, it is obvious that if in the spring or in the month of May we can get information what the mean temperature of the winter (from November to April) has been in the region of the Kara sea, or perhaps at Obdorsk, then it will be possible to form some opinion of the prospects as to the condition of the ice, and the navigation of the Kara sea in the coming season. One will thus be able to make one's arrangements accordingly, and this may prove to be of great importance for the future navigation through this sea.

But in order to give this navigation a still safer foundation in the future, I think it will also be necessary to collect a more complete and systematic knowledge of the conditions of the ice in the Kara sea in the summer and autumn, than we have at present. What we know is only due to more or less accidental voyages in this sea. The observations made during these voyages can only tell us what the conditions of the ice were along the route of the ships, and during the short time the voyage lasted; and we do not know what the conditions were in other parts of this sea and at other times, unless that several ships sailed in various parts of the sea at the same time; but that was not often.

It would, of course, be very desirable to make more systematic investigations in the different parts of this sea during the whole of the summer and the autumn. It will be of the greatest importance to get an accurate knowledge, how great the quantities of ice really are in the whole of this sea in the different years during the navigable season, and also how quickly the ice is diminished during the summer and the autumn; how great the changes in the quantity of ice are from one year to another. It will also be of importance to study to what extent the ice is carried by the wind and currents. At the same time, one will have to examine the currents and their changes, the temperature, and the salinities in the different depths of the sea, and in its different regions during the whole summer and autumn.

For systematic researches of this kind, three or four comparatively small sailing vessels with motors, would be very handy. As early in the summer as the ice permits, these vessels ought to sail into the Kara sea. I would propose that one vessel went through the Yugor strait, or the Kara strait, another through the Matochkin strait, a third north of Novaya Zemlya eastwards, and perhaps a fourth, which ought to be stationed in the Yenisei or at the Dickson harbour, should go westwards from there

to the ice north of the White island, as nearly as possible in the summer, in order to study the distribution of the ice there. These vessels ought to sail in the different parts of the sea as long as possible in the autumn—at any rate some part of October—and make accurate observations on the occurrence and distribution of the ice, etc., at the different periods of the year.

It cannot be doubted that researches of this kind would give a knowledge of the conditions in this sea, based upon accurate observations, which would prove to be of the greatest importance for the navigation in the future. And, as everybody seems to agree that a prosperous development of this navigation will be of the very greatest value for the future development of the great possibilities of Siberia, I cannot but think that the expense and trouble connected with such systematic investigations would be considered to be small, in comparison with the results they will bring. It would naturally be important to collect observations from as many years as possible, and it would, therefore, be desirable that these investigations should be started at once.

If these vessels were equipped with wireless telegraphy, they could also be of immediate service by sending wireless messages from the ice during the navigable season to the wireless stations on the Vaigach, at the Yugor strait, and at Marasale on Yalmal, which could then communicate the information to Europe or to the ships on their way from Europe ; and one could at all times have an idea what the conditions of the ice were, and where the best leads through the ice were to be found. This might save much time, and make the navigation safer.

But in order to obtain information about the distribution of the ice in the Kara sea, and in order to give an immediate communication, aeroplanes would, naturally, be still better than vessels. The distance between Yalmal and Vaigach or the Yugor strait is only between 120 and 160 nautical miles, and no greater than a modern aeroplane can easily cover. If a few depôts with petrol were established along the north-western coasts of Yalmal, it would be quite easy for an aeroplane to take a flight from Marasale, along the coast of Yalmal and across the Kara sea to Vaigach or the Yugor strait, or also in the opposite direction to Marasale, once a week, and give accurate information about the distribution of the ice and the open water. It might also prove to be desirable to establish a wireless station at Matochkin Shar, connected with an aeroplane, which might then give information about the conditions of the ice in that region of the sea.

It seems probable that aeroplanes, and also, perhaps, hydro-aeroplanes, used in this way, will prove of great importance for the navigation through ice-covered seas like the Kara sea, especially as the expenses connected with the use of aeroplanes are not so very great. On the flat Yalmal, and also at the Yugor strait and on the Vaigach, it cannot be difficult to obtain plains sufficiently even to secure a safe rising and landing of the

aeroplane. On the big ice-floes occurring near the coast it is also easy to land and to rise with an aeroplane.

I think, therefore, that if we make full use of all means and facilities which modern development places at our disposal, it might be possible to base the navigation through the Kara sea on a safer foundation than was the case in earlier years. I also consider it probable that it will prove possible to reach the mouth of the Obi and the Yenisei through the Kara sea every year if the necessary precautions be taken to secure a safe passage. An important point is not to go into the ice too early in the season, and not to expect that the navigable season can last very long. As a rule one cannot expect that a ship will be able to make more than one voyage to the Yenisei in one season.

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The PRESIDENT: It is a good many years since the late Captain Wiggins made strenuous and to a large extent successful efforts to open up the sea route along the north coast of Europe and Asia to the Yenisei for the purpose of developing the trade of Siberia. His services were recognized at the time by a handsome presentation of plate of silver from the Czar. The large plate containing the inscription was left by Captain Wiggins to us. On ordinary occasions it may be seen in the rooms of our Society at Kensington Gore, but we have brought it here to-night as an interesting memento of these earlier endeavours, and it is visible in the tea-room. Various attempts have been made since the days of Wiggins, but none so systematic or successful as that of which we are to hear to-night from Mr. Lied, who represents the company that undertook the expedition. The author of the second paper is Dr. Fridtjof Nansen, our old friend and distinguished medallist, who was requested to accompany the expedition for the purpose of scientific observation, mainly with a view to collecting data concerning the ice currents, depths, and other matters that have an important bearing on navigation. We had hoped Dr. Nansen might have been able to come over to take part in this discussion, and I am not certain that this great audience may not have been partly attracted by that expectation, and may therefore be suffering from acute disappointment. However, Mr. Lied will, I am sure, make up for any feelings there may be of that nature, and we shall hear from him of the main results achieved by the expedition, while he will also read to us the most important parts of the paper prepared by Dr. Nansen.

Baron HEYKING: I must confess that I have hardly any qualification for speaking on the Kara sea route if it were not for the fact that I am a citizen of that Empire which more than any other country in the world is bound to derive benefits from the establishment of a regular navigation in the Kara sea. On that account I feel it my pleasant duty to congratulate Mr. Jonas Lied on his successful expedition. His most interesting lecture affords us the possibility of taking a very hopeful view on the possible development of the navigation in the Kara sea; the prospects of the future of that navigation are very bright indeed now that we have the possibility of availing ourselves of the experience of such an authority as Dr. Nansen and the enterprise of the director of the Siberian Company, Mr. Jonas Lied, of the installation of stations of wireless telegraphy at Vaigach, the Yugor strait, and Mare Sale by the Russian Government; of the use of aeroplanes, and of many other devises and inventions which the

modern development of science places at our disposal. It is difficult to overrate the economic importance and value of linking up Northern Siberia with the rest of the world by the Kara sea route. A new economic development of Northern Siberia (once a regular navigation is established through the Kara sea route) will be opened up, and Europe will have the possibility of tapping a new rich source of supply and the necessities of life in Siberia by that sea route. There is hardly any room for doubt that Siberia is destined to become the granary of the world—the chief place of supply for timber and wood for many years to come; one of the centres of the production of dairy products and of many other natural resources. This enormous country, with its vast, hardly touched natural resources, will be able to provide England with any amount of food stuffs and raw products at cheap prices. England is therefore, nearly as much as Russia itself, interested in the Kara sea route and in the establishment of regular navigation to the Yenisei and back. We have listened with intense pleasure to the lecture of Mr. Lied, and, with the permission of Lord Curzon, I should like to propose a hearty vote of thanks to Mr. Lied for his instructive, helpful, and important lecture.

Dr. W. S. Bruce: I do not know why I have been called upon to speak on the Kara sea, because it is a part of the world I have not actually visited, but perhaps it is my association with the Polar Regions during the last twenty years or more, and because of investigations I have carried on during three seasons in the neighbourhood, namely, the Barents sea. There is a sort of veil of mystery over the Polar Regions which unfortunately earns for them the reputation that commercial development is impossible. Therefore it is of great interest to have heard Mr. Lied's account of this voyage to the Yenisei that has, in conjunction with the scientific co-operation of Dr. Nansen, ended in such successful commercial results. Assuredly the time is coming when the whole of the Polar Regions, both north and south, will be open to commerce, just as other parts of the world, and this by the aid of scientific developments, such as wireless telegraphy, aeroplanes, and the like. It was only yesterday that the Governor of the Falkland Islands told me that there is now wireless telegraphic service from South Orkneys, through the South Shetlands to Falkland Islands, and thence to the rest of the world, while in Spitsbergen there are four or five wireless stations, one of which is in communication with Cornwall, and elsewhere. Science directs commerce. The scientific investigations of the Belgians, Swedes, French, and Scots in the Antarctic Regions in the vicinity of Cape Horn have, for instance, led to commercial development which gives a return of £1,300,000 sterling per annum. This is one result of recent Polar expeditions, and shows how a part of the world ten years ago utterly despised from the point of view of commerce has rapidly developed from the commercial point of view. So I believe it is that same fear about the Yenisei that has kept back the commercial development of western Siberia which is bound to advance and probably in the direction that Mr. Lied has indicated this evening. The lecture has been of great interest, showing how these parts of the Arctic Regions are capable of coming within the radius of modern commerce.

The President: There is usually placed upon me as President at the end of the evening the agreeable task of proposing a vote of thanks to the reader of the paper; but to-night, as you will have noticed, I have been relieved of that task by Baron Heyking, the Russian Consul-General in London, who discharged it in a manner and with an authority far greater than any that I could assume. Every one who listened to the paper will agree with the remarks that have

been made by the subsequent speakers, that we have had a bright, attractive, and business-like lecture. I was interested to notice that the lecturer, no doubt with commendable prudence, started with the assumption that none of us had ever heard of Siberia. He proceeded to give us a good deal of useful information upon that subject, and finally enumerated the considerations that led both him and Nansen to think that there is a positive and, let us hope, a certain future before this new branch of trade. And what an interesting reflection it is, that so rapid is the march of science nowadays, so closely is it allied with almost every branch of human activity, that we are told the development of this traffic in the future will be largely dependent on the one hand on the use of wireless telegraphy, on the other of aeroplanes! Mr. Lied did not say—again with commendable prudence—that he himself proposed to adopt the latter method of navigation, and for my own part I counsel him to adhere to the respectable Mediterranean steamer that he placed before us on the screen this evening. However that may be, I am confident, in expressing our thanks to him for his paper, that we all, without regard to any advantages that may accrue to us at Grimsby, wish success to the excellent commercial venture on which the Russian authorities have embarked, and which seems to me to have a very capable leader in the person of the reader of our paper to-night.

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## A JOURNEY THROUGH CENTRAL ARABIA.*

By Captain G. LEACHMAN, The Royal Sussex Regiment.

THE journey described in this paper was undertaken in the latter months of 1912, my object being, if possible, to travel from Damascus in a south-easterly direction to the wells of Leina, touched by me in a former expedition, and thence to strike south to Kasim; and then in due course I hoped to reach the southern capital of Central Arabia, Riadh. From that place I hoped to penetrate into the totally unexplored country of the Great Desert of the Ruba-el-Khali to the south, but this eventually proved to be impossible.

I left Damascus in the beginning of November by the route followed till a month previously by the camel post, which used to cross the 500 odd miles of desert between Damascus and Baghdad in nine days, but had been discontinued. Travellers who have performed this journey with the post will remember what a nightmare ride it was. The route had been abandoned owing to frequent raids by Bedouin, and the consequent loss of the post, and the bags were despatched by a longer but safer road through Aleppo. I had with me a party of twenty "Ageyl" returning to their homes in Kasim.

There is much difference of opinion as to the meaning of the word "Ageyl," some older writers believing it to be a tribe in Central Arabia.

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* Map, p. 604.

It appears to be used to describe those Arabs of Kasim who are engaged in the trade in camels, horses, and merchandise between Koweit, Baghdad, Damascus, and Egypt. Whatever the actual name implies, it is a fact that the Ageyl can pass through the whole of Northern Arabia with nothing to fear from raiding parties of Bedouin. I was soon to have proof of this.

After leaving behind us Dumeir, the most easterly village of the Damascus plain, the route lies over flat gravelly plains occasionally broken by a long swelling ridge. Bitter cold was experienced in these plains in the winter, and the "jirbas" or water-skins were frequently frozen hard in the morning—so much so that we had to thaw them by the fire before loading, or otherwise they would rub sores in the camels' sides. On the second night out from Dumeir, we were making our way through the darkness, half asleep, when without any apparent cause our camels sheered off to one side. They had discovered another party approaching. Some one on our side raised a cry of "Silahkum, Silahkum," "To your arms." This seemed hardly wise, as we had only three rifles among us, and the other side, who were not more than 100 yards off, heard the cry and promptly responded by firing into the black mass of camels. Thereupon our cry was changed to "Ageyl, Ageyl," and the firing ceased at once. The other party approached and proved to be a "ghrazzu" or raiding party of the Bedouin tribe of Walid Ali returning from an unsuccessful expedition. "Ghrazzu" are particularly active in winter, as at that time they can usually find water lying in unfrequented spots from recent rain, and they are not obliged to visit known watering-places, always a source of danger to them. The Walid Ali are a section of the Ruwala, a branch of the very large clan of the Anaize. The Ruwala occupy the eastern part of Syrian desert, which they cross to make raids on the other branch of the Anaize, the Amarat, with whom they are at enmity. These small "ghrazzus," seldom exceeding a dozen men in number, travel long distances in their expeditions. On the following day we encountered another party of Walid Ali, which had been on a foray into the neighbourhood of Deir-ez-Zor, 300 miles from their own "dirat" or country. They were bringing with them many looted camels.

As we journeyed further into the centre of the Syrian desert, the country became more and more barren, and where the track crossed the northern corner of the Hamad, there is scarcely a vestige of herbage for the greater part of the year, the plain being covered with black basaltic flints, most trying going for the feet of camels. In spring, however, as is the whole desert, it is covered with grass a foot high. On the fifth day from Damascus, in a country broken by a succession of wadis running north-east, my own party left the "Ageyl," who were continuing on their way to Baghdad. They do not care to bring the profits of their camel selling across this desert on their person, so they take drafts from Damascus on Arabs in Baghdad, from which place they travel by steamer

to Busra or Koweit and thence accompany caravans to Kasim. From this point on the Damascus-Baghdad route commenced our actual journey of penetration into Central Arabia.

My party now consisted of a companion of former travels named Saleh, an "Ageyl," and two youths from Kasim, making four in all. As we were to pass through the country of the Anaize and the Shammar, tribes of Bedouin, we had with us a man from each of these tribes, who would pass us through without any danger from raiding parties. In Arabia such very necessary companions for the road are called "rafik."

Our point of departure from the great Damascus-Baghdad route was close to the wells of Ghara, or, as they are sometimes called, Meluse, or Bir Meluse on most maps. From here taking a south-easterly direction we crossed many small wadis or "shaibs," and in two days dropped into the important Wadi Hauran, by means of which this part of northern Arabia is principally drained towards the Euphrates. At this point it appeared as a broad depression 10 miles wide, while in the middle ran a watercourse a few hundred yards in width. After rain, water stands here for a short time, but I doubt if ever there is anything in the nature of running water at this point. The wadi follows a north-easterly course, and finally empties into the Euphrates some miles above Hit.

Water is found at a short distance from the surface, and there are many wells in the bed. At the wells of el Mat, the water was at a level of 30 feet down. Here were some "Saleib," or "Slaib," the gypsies of the desert, busily watering, preparatory to moving their camp. They had received tidings by some mysterious agency that a camp of Bedouin was moving to these same wells, and the Saleib have a dislike to the propinquity of Bedu, who seize their flocks and donkeys.

There is no certain knowledge of the origin of these people, though various theories have been put forward, one of which is that they are descendants of the Crusaders, "salib" meaning a cross. The Saleib themselves are quite ignorant of their origin, but the Bedu are fond of saying they are related to the "Anglez." They are found all over the northern Arabian desert, on the slopes between the Persian gulf and Nejd, and also to the west of Nejd. They do not appear to visit the southern deserts. Their camps consist usually of about twenty tents of a smaller size than those of Bedouin tribes, and they are generally pitched at a distance from some watering-place only known to the Saleib. They own few camels and move their belongings and themselves on donkeys, which apparently endure thirst in much the same way as a camel. They possess goats and sheep, and, though having an appearance of poverty, probably assumed in order not to excite the cupidity of the Bedouin, they generally have plenty to eat. The Bedouin do not usually make raids on them, but will extract large hospitality from them. The Saleib show a wonderful similarity of feature, while they speak with a high-pitched voice, and usually all at once; their women are spoken of among Bedouin for their beauty, and

have a not too good reputation. The men usually wear a smock-like garment made of gazelle-skins with a hood to cover the head. In this they are said to be able to approach within a few yards of a herd of gazelle, and they seldom fail in a stalk; as their weapons are very ancient muzzle-loaders, often 6 feet long, the hunter would have little chance at any distance. I have seen the trail in the sand where a hunter has crawled for very nearly a mile in his approach to a herd.

Leaving the well of el Mat, and taking a more southerly course, we were able to avoid the very broken ground caused by the wadis forming the district known to the Arabs as el Wadian. Some score of wadis with their tributaries have their origin here and run in a north-easterly direction, the majority losing themselves in the sand about 100 miles west of the Euphrates, while others join the marshes of the Euphrates in the vicinity of Kerbela.

El Wadian had lately been traversed by the Austrian traveller, Dr. Musil, who threaded through this mass of wadis, which even the Bedouin have some difficulty in naming. After six waterless days we reached some wells in a wadi known as Aghrar or Arar, and here were a large camp of Saleib, one of whom had been Dr. Musil's companion for a time, and apparently a not too reliable one. Their sheikh was apparently well known as a poet, who would compose verses extolling the perfections of any one from whom he might expect a reward. At night after I had lain down I heard him tell Saleh, my companion, that he had just composed a poem about me, and he was wondering how much I should give him. The poem was duly recited to me in a very cold and cheerless dawn, and I am afraid his reward did not come up to his expectations. Hereabouts I had crossed the route of Captains Aylmer and Butler, who came down from Hit to Jauf in 1909.* From this point east to the wells of Hazil, no European traveller is known to have passed; the nature of the ground changes, the gravelly surface giving place to tracts of disintegrated lime-stone with many inequalities and low hills. Numbers of birds and animals were to be seen, partridge, quail, hares, "houbara," or the great bustard, and great herds of gazelle. There were also an extraordinary quantity and variety of snakes, all called poisonous by the Arabs, as to them no snake is harmless. Four days' marching in a south-easterly direction brought us to the wells of Hazil. About a dozen miles before reaching these wells we entered what my Arabs called Wadi el Kher, here almost imperceptible as a wadi, and having a width of about 4 miles. It is known that this wadi has its head in the neighbourhood of Jauf, and I have crossed it in a previous journey some 80 miles due north of this point, so it appears that this great feature of northern Arabian drainage takes a sharp turn here to the north; Musil stated that he had visited it many

* See *G.J.*, May, 1909, "Journey of Captains Butler and Aylmer from Nejef through Jauf to Damascus."

miles to the north-west, but I see by his published map that he calls his wadi the Ab el Kur, and shows many miles south-east of his farthest point in this direction.*

Considering the question as to whether the Wadi el Kher forms a route between the great central oasis of Jauf and Nejef on the Euphrates in continuation of a route from Maan on the Hejaz railway, the whole forming part of the ancient trade route between Egypt and Mesopotamia, it appears that at present there is no definite caravan route, used as such, between Jauf and Nejef, as the only people travelling between the two places would seem to be single camel-riders, or "ageyl."

Such travellers would do the 300 miles between the two places in five or six days, and in summer would probably halt at the wells of Arar and then ride straight on to Nejef, while in winter it is probable they would not water at all until they reached the Euphrates.

It is doubtful if a camel caravan would follow the bed of such a feature as the Wadi el Kher the whole way from Jauf to Nejef, as, although the wadi is wide enough in itself, the going along the floor of the ravine would be bad. I learned that Jauf, the principal oasis in northern Arabia, had now fallen into the hands of Sheikh-ibn-Sheilan of the Ruwala branch of the Anaize, the large Bedouin tribe who roam over the country north-west of Jauf up to the confines of Damascus, and even up to the Euphrates.

They are now enemies of the Amarat, the other great branch of the Anaize, who cover the country to the north-east up to the Euphrates in that direction.

This Ruwala Sheikh now in Jauf would scarcely venture on sending camel caravans through to Nejef, as they would probably meet with a hostile reception from his enemies the Amarat. The principal trade of Jauf is now with Syria and Palestine along the routes through the Wadi Sirhan, these westerly tracks being in the hands of their kindred. Thus it would seem that in recent years a change has taken place in the possession of Jauf, as when Captains Butler and Aylmer visited the place in 1909, they were received somewhat coldly by a governor appointed by Ibn Rashid, the chief of the great faction of northern Arabia who resides in Hail, far to the south on the other side of the great Nefud Desert.†

The wells of Hazil are next in importance in this district after those of Leina. They number about 100 separate wells, scattered over a depression some 10 miles in circumference. Water is found at 60 feet, and is fairly constant; the Swedish traveller Wallin,‡ the only previous visitor

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* *G.J.*, May, 1910, "Musil's Explorations in Northern Arabia, 1908–9."

† See note on previous page.

‡ *Proceedings* of the R.G.S., vol. **20**, 1850. As Wallin's method of fixing Hazil was to start from a point on the edge of the Nefud, and from it, he says, "we took the pole star between our eyebrows," to use a Bedouin phrase, and thus, marching for two days over the plain, we camped at the wells of Hazil. This somewhat irregular

to these wells, who passed here in June, 1848, states that he found water at 20 fathoms, which seems excessive; he did not use instruments, and according to my computation, places Hazil many miles too far to the east. These wells are greatly frequented by the Amarat clan of the Anaize Bedouin, and for many miles round are found the traces of great encampments. The majority of desert wells visited in this part of northern Arabia are very narrow at the surface and seldom more than 3 feet across, while below they widen out. Alongside the mouth is a small trough, into which the water is poured as it is brought to the surface. Here the camel drinks, in itself a somewhat remarkable sight, as, however thirsty he may be, it is done in the most leisurely fashion, and he appears to taste the full joy of a long drink in the manner of a gourmet born. He first wets his lips and again raising his head proceeds to shake it and look about him. After a pause he drinks a little more, and the same process is repeated, and thus each drop of the precious liquid is absorbed with appropriate relish. In the winter a camel will last seven days without water and without great discomfort, while in the spring when the green grass appears, he will drink but rarely, and remains often a couple of months waterless. As for feeding, an hour or so a day of very sparse grazing will suffice the camel on a short journey. The "ageyl" usually carry a mixture of millet and coarse flour called "alej," which they make up every night into a smallish ball, the size of a man's fist, and give five or six to their camels. In southern Nejd the Arabs make up dates made into balls, stones and all, which is reputed to be beneficial as medicine.

The Bedouin is extraordinarily kind to his camel, and in return the Arabian camel is a very different animal to the ill-mannered, treacherous variety encountered in India. The Arabian camel never bites or kicks, and except for his inevitable groans of complaint when mounted, shows no signs of unwillingness. His powers of endurance are extraordinary, and some of the stories of great journeys done by camels are almost beyond belief. The camel rider whose duty it was to carry the post from Damascus to Baghdad generally covered an average of 60 miles a day for nine days, which makes a fine performance. The story is often told of the rider who, riding with urgent news to one of the Ibn Rashid chiefs at that time in Riadh, covered the 600 miles between Nejef and Riadh in six days, the camel dying as it came in. Burkhardt has a story of a camel who covered 115 miles in 11 hours.

From the wells of Hazil the next stage led towards the wells of Leina. Still following a south-easterly course from Hazil, we soon entered the district known as Al Hajara "the stony," which extends round the north-east corner of the Nefud, and bears a bad repute for camels and travellers, the camels generally falling lame from the sharp flint stones. Having traversed

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method of topographical direction may well have led to error in fixing the position of the place.

this, the northern part of the great Nefud desert is entered, and between the Hajara and the Nefud a sandy tract intervenes known to Beduin as Sha'af, a corner of which it is necessary to cross to reach Leina. This formed my second visit to the Nefud, and it only increased my liking for it. This great tract of sand, stretching as it does for some 350 miles east and west, and spoken of in terms of horror by many travellers such as Palgrave, is to the Bedouin more agreeable than most other places. Cool in summer, warm in winter, soft to lie upon, with abundance of fuel and grazing, its borders afford a home for the great Shammar tribes for many months of the year. Here I saw for the first time those remarkable horse-shoe depressions in the sand usually called by Arabs "felk." The Shammar tribesmen spoke of those seen by me as "garat," but used the word "felk" as designating the depressions found in the Nefud between Jauf and Hail which are noticed by several travellers. I have found them in the Dahana to the east as well as in the Nefud, and in all cases the largest depressions appear to have the point of the horseshoe facing to the west, while the sides point due east. The depth underneath the toe is from 70 to 100 feet with firm precipitous walls, gradually becoming shallower towards the east. From point of horseshoe to the heel usually is a length of 400–500 yards. The form is most regular.

I crossed the Baghdad-Mecca pilgrim route known as the Derb Zobeide, which was the road by which the Blunts in 1879 and Huber in 1881 travelled down from Hail to Baghdad, then leaving the Nefud on the fourth day from Hazil, we dropped into the depression in which are situated the wells of Leina. These famous wells were touched by me in my journey of 1910, at which time, owing to winter rains, the whole of the valley was covered in grass a foot high with thousands of Bedouin tents dotted about the neighbourhood. Now not a blade of grass or desert bush was visible. The water in these wells appears to be very constant, as I found it now at the same level as on my previous visit, though with a slightly brackish taste. Moreover, the Arabs have a saying which runs, "Leina, Leina, Mithal Ajine, Gada b'il Leina, 'Asha b'il Busra," meaning that the water of Leina has the same effect as a certain form of excellent bread, and so refreshes the traveller that one who breaks his fast in Leina will go so fast that he will arrive to dine in Busra 250 miles away. Leaving Leina we at once entered the Dahana, the name given to the strip of sand which breaks off from the Nefud here and following a southerly or south-easterly course, passes between the Persian gulf and Central Arabia, and eventually joins the Ruba-el-Khali, the great southern desert, 700 miles to the south. Both here and also in the district between Riadh and el Hasa at points where I have crossed it, the Dahana has had a width of about 15 miles. The sand is formed in waves 300 yards apart and 50 feet high, running east and west with steepish sides, while the sand itself appears to be of a heavier nature than that of the Nefud farther north. In this part of the Dahana we came upon an

WELLS OF HAZIL.

KUSAIBA IN KASIM.

BOREIDA.

EL MUDHNIB.

encampment of Sinjar Arabs, who are a section of the Shammar stock; and much questioning ensued as to the whereabouts of various tribes of Arabs, the fall of rain in the country, the existence and whereabouts of raiding parties, and the other usual matters of interest to the Bedu. As I did not wish to visit my former host, the Shammar chieftain, Ibn Rashid, whose capital is Hail, and who had prevented me travelling thither before, I thought it inadvisable to say I was an Englishman, but found it quite easy to pass myself off as a Musalawi, or an inhabitant of Mosul in north Mesopotamia; the fact that my Arabic was indifferent did not appear to be considered curious or raise any suspicions in the minds of these people. I have found the same thing in some of the Central Arabian towns, where I have thought it better to conceal my identity, and I found my only difficulty was confined to my not knowing the current price of camels, food stuffs, etc., in Baghdad or Damascus, which is a question invariably asked by an Arab of a new-comer who claims to be a native of those places.

After leaving the Dahana, we crossed a district known as Taisiat, traversed by many well-marked wadis which have their sources on the edge of the Nefud and run towards the great Wadi er Rumma, which drains all this country towards Busra. After rain there must be a great rush of water in these wadis, as they contain patches of brushwood heaped up to a height of several feet. The only tree of the northern deserts, the "sidr," a kind of acacia, grows here in the wadi beds to a height of 15 to 20 feet, and is met with in greater quantity than in other places on the route. Most of the district is formed of calcareous rocks similar to the Hajara, and across this runs a line of mounds of stone which ultimately reach the wells of Zubire and are called by the Arabs "a road." The origin of these mounds is difficult to comprehend, unless some public-spirited person in olden times endeavoured to form a track of loose stones. The Arabs say it must be the work of Zobeide, Harun er Rashid's queen, the great benefactor of this part of the world.

My party watered at the wells of Zubire on the second day. These wells are situated in a depression on the edge of the Nefud, and are excavations dug through the sand to the rock beneath. Large numbers of Shammar Bedouin were watering their camels here, and the supply was almost exhausted. They told me that a night's rest would, however, ensure a plentiful supply in the morning.

On leaving Zubire we entered a strip of sand known as the Ard-el-Madhua, which certainly appeared to me to present greater difficulties to travel than I had met with previously. A strip of sand similar to the Dahana, breaks off from the Nefud, and having a width of about 6 miles runs south-south-east to the Wadi er Rumma, on the edge of which it ceases. It is formed of great waves of sand running east and west with a difference in level of 150 feet between trough and crest, while at certain places horseshoe depressions are encountered in the trough. The sand is a darker red than that of the Nefud, very heavy, and most difficult to

traverse, while the sides of the waves are so precipitous that it is necessary to dismount from one's camel to get over them. South of Ard-el-Madhua is a stony plain known as Shamat-el-Zarud, after which a sandy strip is entered, known as the Bitte, which consists of several successive strips of sand which, instead of being detached from the Nefud in the north, come from the Dahana in the neighbourhood of Zilfi, and, according to my Arabs, stop short of reaching the Nefud. These seven strips rise 150 feet above the plain, and are each about one mile broad, while between them is a gravelly depression also about a mile broad. The north side of each wave is very precipitous, rising in successive steps to the highest point, from whence it trends to the south in one long slope. The wind here appears, as a rule, to blow from the south, which would account for this curious formation. South of the Bitte another similar obstacle is met with, formed by a down-like wave of sand 300 feet high with gently sloping sides, known as Nuwathir. This, the Arabs tell me, breaks off from the Bitte to the south.

From here a day's march over a gravelly plain brought the party to Kasim, and on the twenty-eighth day from Damascus at nightfall we reached the outskirts of Kusaiba, the border town between the territory of Ibn Rashid, the Shammar Emir, and El Kasim.

Before describing my further journey in Central Arabia, it seems advisable to give some account of the governing power and very tangled politics of this part of the country. It must first be stated that all the inhabited portion of Central Arabia is known as Nejd, and this is divided into two great divisions with an ever-changing boundary. The northern division or the Shammar Emirate or kingdom is in the hands of the family of Ibn Rashid, a member of which in former days acted as governor of these districts, and was a dependent of the southern kingdom of Ibn Saud; one of these governors broke away from his overlord, gathered together the northern Bedouin tribes, including the Shammar and Harb, and formed this great northern power with its capital at Hail. The southern division or Wahabi kingdom, in the hands of the family of Ibn Saud, has its seat at Riadh, and the two powers are at almost perpetual warfare. The bone of contention is usually the district known as El Kasim lying midway between the two capitals. Here are the two great independent towns of Aneize and Boreida, with many rich villages in the neighbourhood; the district contains a travelled, intelligent, and war-like people, who attach themselves to one side or the other, and usually bring victory to the power with which they side. The Turks themselves have laid claim to Kasim, and though defeated on two occasions in 1904 by the Kasimis, nominally occupied Kasim for a couple of years before their soldiery were withdrawn or deserted. On their evacuation in 1906, Kasim became a dependency of Ibn Saud, and remains so at the present time. Just now Ibn Rashid and Ibn Saud are at peace, though how long this state of things will continue is doubtful.

The border-line between the Shammar kingdom and Kasim runs north of the towns of Kusaiba and Kuwara. These two towns change hands constantly according as Ibn Saud or Ibn Rashid are in the ascendant. Kusaiba is a straggling town made up of several separate quarters, each containing a number of houses, the whole stretching for a mile along the foot of a precipitous sandstone cliff 300 feet in height. On the top of the cliff are watch towers, characteristic of all Nejdi towns, in each of which in time of warfare is stationed a watchman supplied by public contribution to give notice of the approach of the enemy. Water is to be found within a foot or two of the surface near the town, and its abundance causes large numbers of mosquitoes. Even in winter the air in the town is sultry, and in summer the heat must be intense, owing to its rather confined situation at the foot of the high cliff. The people have an extremely sallow, unhealthy appearance, and a languid temperament.

Our party had now crossed the 800 miles of desert from Damascus to Kasim without mishap, in spite of the evil forebodings of "Ageyl" and others upon our setting out; and we thought we might reasonably expect henceforward to journey in security in these more settled districts. It was rather a shock, therefore, to hear that all roads through Kasim, and especially those from Kusaiba to Boreida, were unsafe for travellers, owing to recent raids by Ataiba Bedouin, who only a week before had held up and robbed the headman of Kusaiba himself. No Ataiba "rafik," or travelling companion was to be had, so we decided to leave without one, and mounting the high cliff at the back of the town before sunset we remained with our camels concealed in a hollow till dark to avoid any Bedouin look-out party who might be on the watch for travellers starting from the town. We escaped observation, and as soon as night had fallen we pushed rapidly across the stony desert, and a couple of hours before dawn slept beside our camels on the outskirts of Ayun. This is a town of 4000 inhabitants, also known as Ayun el Kasim to distinguish it from Ayun es Sirr farther to the south, and forms a stage on the main road from Hail to Boreida. The Emir or Governor of the town was a brother of my companion Saleh, who had left his native place many years before as a boy. Riding into the town in the dawn Saleh was recognized by a few of his townsmen, and the news of his arrival soon brought relations of all sorts, sizes, and sexes flocking round him, after which we were led in triumph to the Emir's house. Saleh whispered in his brother's ear that I was an Englishman, and received in return strict injunctions from him to say that I was to pass myself as a Musalawi, or inhabitant of Musul in Mesopotamia; I did so, and then I was received everywhere with extraordinary courtesy and kindness as the companion of the Governor's brother. The round of every "Kahwa" or private coffee house had to be made, and a hundred times the same questions were asked about our journey and tidings of natives of Ayun who might be in Baghdad or Damascus. It seemed that Saleh had seen every one of them a few days

before leaving, and each one appeared to have asked to be remembered to the questioner. A feast was given in our honour, in the course of which a lump of exceptionally tough meat went the wrong way, and I was seized with a violent fit of choking; on which the assembled diners, to the number of fifty or so, at once began to tell each other how difficult it must be for a civilized person like myself to fall in with their savage ways, seeing that we in our cultured manner fed ourselves with a spoon, while now I had to eat with my hands.

Ayun is without walls, which is rather the exception in Central Arabia, and specially remarkable in a border town. It lies in a sandy basin with low sandstone hills round three sides of it, while its mud-built houses are ensconced among the date gardens and cultivation, not at some distance from them as is usually the case. The inhabitants appear most broad-minded, business-like, and travelled, and the community is a very happy one. Few old men are to be seen, a result of the immense losses suffered by this border town in the perpetual struggle between the families of Saud and Rashid. This is similar to other Central Arabian towns; Ayun is governed by an Emir appointed by Ibn Saud from the leading family of the place, in which the office is hereditary. His business is to keep order, collect taxes, and muster levies to serve under the banner of Ibn Saud in case of necessity. In return for this he receives a certain amount of pay and a great deal of dignity.

I had intended to continue my march to the south along the western road through Rass and by the west of Kasim through districts which for the most part have not been seen by a European; but at Ayun I heard that Ibn Saud, the great Emir himself, had come up to Boreida on a visit. I explained to the Governor of Ayun the route I wished to take, and I also mentioned that, much as I wished to visit Ibn Saud in his capital Riadh, the last thing I wanted was to meet him in Boreida, from which place he could easily insist on my retracing my steps towards Kuwait. The Governor showed me how difficult it was for him to permit me to travel by the western route, which would avoid Boreida and a meeting with Ibn Saud, stating that if he did so he would incur the displeasure of his master, and it might cost him his post. Therefore with gloomy forebodings Saleh and myself decided to set out for Boreida, 28 miles south of Ayun. We passed on the way a few villages and date plantations showing a varying degree of fertility; but it is clear there must have been great changes since Palgrave's time, who travelled through here in disguise in 1862, and states he saw to the utmost horizon an immense plain studded with towns and villages, towers and groves, announcing everywhere life, opulence, and activity. On nearing Boreida we crossed a desert of white sand-dunes, and at last at evening the walled town itself appeared suddenly, as if dropped from the clouds into this sandy waste. Coming from the north and east no date gardens are visible to the traveller, but only a solid block of square houses surrounded by a high wall becomes apparent.

A great wooden door stood open in a lofty gateway in the wall; we entered and crossed a wide open space, at the north-east end of which was a stronghold of Ibn Saud, where he is said to keep an armed force, to cope with a rising of the turbulent tribesmen in the neighbourhood. We couched our camels at the doorway of the house of the Emir, Ibn Maamr, a man of Riadh put in as governor by Ibn Saud. A number of armed negro slaves from the castle soon gathered round, and from them I found, much to my relief, that Ibn Saud had left that morning on his return to Riadh. A certain excitement was caused among the bystanders by my statement that I was an Englishman on business intent with Ibn Saud, but the Emir sent no word, and apparently could not make up his mind to receive me. However, within a few minutes of my arrival a messenger on a fast camel was speeding south in pursuit of Ibn Saud with tidings of my appearance. For an hour or more we remained sitting in the open courtyard by our camels, subject to the attentions of the loafers of Boreida, till at last we were shown to a very dirty house, and left in peace, but dinnerless. At night I was led to the presence of the Emir, who, though somewhat offended at my refusal to tell him what was my business with Ibn Saud—although I should have been puzzled to tell him this, as in truth I had none—yet consented to listen to my suggestion that in all probability Ibn Saud would not be quite pleased with the nature of my reception at Boreida. After this we became quite friendly, but I discovered that he was really a weak personage under the thumb of his negro slaves, without any direct feeling against me, and soon after I took the opportunity to withdraw.

Boreida is the rival of Anaize in Kasim, and the fourth largest town in Nejd, and has a population of about 10,000 people. A ridge of white sand 200 feet high driven by the wind into curious shapes protects the town on the west, while intervening between it and the houses of the town is a long strip of dense date gardens and cultivation. Water is found in these within a few feet of the surface, but the constantly encroaching sand forms a constant menace to the cultivator. The inhabitants of Boreida as well as those of Anaize are remarkable for their business proclivities, and much trade is carried on with the coast towns of the Persian gulf and with the surrounding Bedouin tribes, while there is a large bazaar in the place itself. In spite of this, Palgrave, Huber, and Doughty, all of whom visited the place, testify to the bigoted and fanatical nature of the townsmen, while the last-named narrowly escaped with his life. Even at the present time, although communication with the Persian gulf and Irak has increased and the state of the country is peaceful, it is one of the few towns in Nejd in which I met with any discourtesy.

The messenger despatched by the Governor to Ibn Saud returned with instructions from the Emir that I was to be sent after him to Riadh, and I also found on my way that Ibn Saud had most kindly issued orders for my comfort at every town on the road, which greatly smoothed matters.

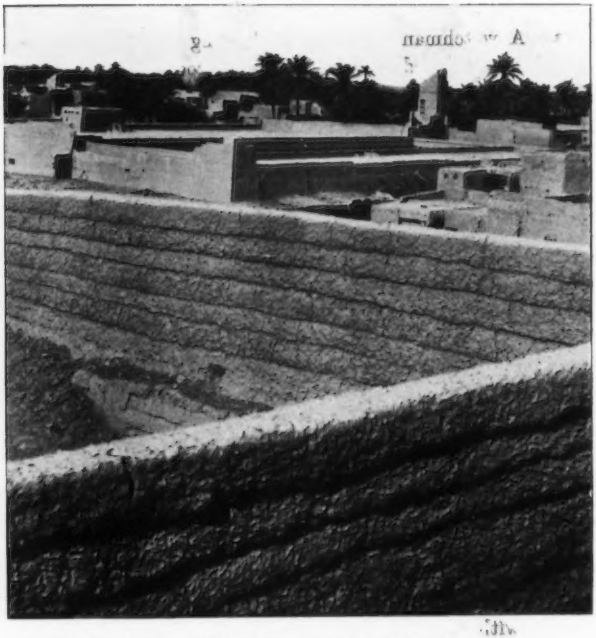
I therefore had a chance of travelling from Boreida by the direct route to Riadh through Shagra in Woshm, which has been traversed once only by Captain Sadleir, an officer from India, nearly a hundred years ago. We set out with one "rafik" or travelling companion from the Ateiba tribe of Bedouins, who, though quite a young man, appeared to have visited most parts of Arabia as a member of raiding parties at one time or another. Passing first through the belt of sand-dunes which surround Boreida and leaving the road to Anaize to the west, after going 10 miles we entered the bed of that great artery of north-eastern Arabia, the Wadi Rumma, known here as El Wadi, and from the borders of Kasim to its outlet near Zobeir as El Batin or the depression. At Anaize, which lies on its south bank some 10 miles west of my route, the bed of the wadi is said to be 2 miles broad, but at our point of crossing it measured not more than 500 yards in width, having a well-marked watercourse along the foot of a white limestone cliff on its southern bank. After leaving the wadi the route trends in a south-easterly direction over a flat unfertile plain, which was in many places encrusted with salt. The general slope of the country is here to the eastward, and skirting the east of our route ran a cliff of a type known to the Arabs as "jal," which was 200 feet high, and held up a strip of sand which stretched from this point to the neighbourhood of Shagra. Many isolated ports or small strongholds were met with, in which in the spring cultivators from the towns live and till the ground, returning to their town houses after the harvest.

On leaving the village of Aufizie we reached the boundary of Kasim, and thenceforward had entered into southern Nejd, or the Wahabi kingdom proper. The name of the district was el Mudhnib, and the town of that name, 35 miles south-east of Boreida, lies at the foot of a projecting bluff of the eastern cliff. It has a population of about 2000, who must be fully occupied in tending the very extensive date gardens and cultivation which stretch for more than a mile on three sides of the town. The water which flows down the slope from the west and is held up by the cliff which overshadows the town on the east is for the most part brackish and undrinkable by human beings. We knew there must be some well of sweet water near the town, but none of the passers-by would tell us where it was, or in fact give any answer at all. Following the usual custom, they were afraid that if they entered into conversation with us they might have to entertain us for the night. The hospitality of the townsman is a poor thing as compared with that of the Bedu of the desert. Yet the entire population of Nejd derive their origin from various great Bedouin stocks, especially from different sections of the Anaize, and should understand the laws of hospitality. A great part of this settled population are descended from the ancient tribe the Beni Tamim, who, I believe, are now no more seen as Bedouin, but have become entirely sedentary.

Leaving Mudhnib we traversed a loamy plain, still having the sandy cliffs on the east side, and we chanced, during the night, to pass the village

JEBEL TOWEIK.

RIADH FROM SOUTH.



GREAT MOSQUE AND TYPICAL WAHABI MINARET, RIADH.

PALACE SLAVES IN RIADH. THE CENTRE FIGURE IN WHITE IS IBN SAUD'S BROTHER.

of Murabba. [illegible] on the wall, hearing conversation, bade us halt, to which we answered that we proposed proceeding. By this time several other voices were heard on the wall, and fresh orders were shouted at us to halt or be fired at. We shouted in reply that we were on our way to visit Ibn Saud, but the villagers implied that they had heard the story before, and as we were probably robbers we had better halt. We accordingly thought it best to halt, and off-loaded our camels where we were—it happened to be an unsavoury spot beneath the village wall—and lit a fire. Presently some of the inhabitants came round expecting us to prepare the customary coffee. We were not, however, feeling sociable, and besides, if I was obliged to stay there, I thought I might as well get some sleep. Our visitors therefore melted away, all became quiet within the walls, and an hour or so before dawn we started afresh on our way towards Riadh.

During the course of the next day, we passed out of the district of El Mudhnib and dropped into the depression known as Ayun es Sirr. This is a tract of loamy soil 20 miles in length and a little more in breadth, and having no surface outlet for its drainage. After rain the water forms in the depression great lakes, and even at the time of my visit springs were flowing. Various "kasrs" or fortified châteaux are dotted about at distances of several miles from each other. High walls surround these "kasrs," and inside them are the dwellings of the owner of the land in the vicinity with his dependants and slaves, often to the number of sixty or seventy. Absolute equality seems to obtain between master and servant as regards conversation, and they appear a very happy community.

My party spent a night in the "kasr" of one Nasir of the despised Heteymi stock, but one who was renowned far and wide for his hospitality. He turned out a bigoted old gentleman, and talked for hours on the subject of religion, insisting on my repeating the "Kalamat" from the Koran. "There is no God but one God, and Muhammad is His prophet," and he was much annoyed that I always stopped at the end of the first half of the creed. I took from him a negro slave he provided me as servant, after paying off his debts to Nasir, but when we arrived in Riadh he strangely disappeared, a sign that negroes even when long settled in Arabia do not assume easily the strictness of the poorest Bedouin as regards money matters.

From Ayun we turned east and crossed a sandy strip, here 15 miles wide, emerging into stony plains with patches of black basaltic rock. Our road lay over a marked ridge with square-topped sandstone hills along it, from which the first distant view of Jebel Toweik was obtainable; the track then descends through a narrow gorge and enters the sandy plain in which is situated Shakra, the capital of this district of Woshm.

This district, which is practically unknown to Europeans, is one of the five districts of Southern Nejd; it is situated north-west of Riadh, the capital of Nejd, and consists of a strip of sandy loam bounded on the east by Jebel Toweik, and having its limits on the west undefined. It is

terminated in the south by the Wadi Haisiat, the name given in its proper course to that great artery of southern Nejd, the Wadi Hanifa. A narrow band of sand runs down the centre of the district, and into this all the western part of the district appears to drain, the water eventually finding its way into the small district of Dhruma, which bounds the district on the south. Woshm contains some score of towns and villages, and numbers of isolated "kasrs" which are occupied during the spring and summer months by cultivators from the town.

The people, who are mostly settled Anaize and Beni Tamim Arabs, are known for their warlike qualities, and are also much less fanatical than the people of Kasim.

Shakra, the capital of Woshm, has a population of about 5000 souls. It lies at the east end of a long sandy slope, and its date plantations and gardens stretch for about a mile. Our road approaches the town from the north, passing through an outer wall (in many places in ruins), and then running along a causeway raised 20 feet above the surrounding gardens. This causeway is caused by the sand driven through the opening made in the wall for the road. We made our way along the causeway and through a second and newer wall, and found ourselves in a town which had an air of cleanliness and general prosperity unequalled in southern Nejd. The Emir or Governor, Muhammad Ibn Saud, a young man of great charm of manner and very broad-minded views, received me at his "kasr," in spite of the protests of his chief Mulla, who would have had me camp outside the town. The conversation was of an astonishingly wide range, and topics of European interest, such as aeroplanes and wireless telegraphy, were freely discussed. In Shakra a certain amount of Indian influence becomes apparent, and the Indian currency and weights are used for reckoning. In former years the town supplied the majority of horses to the Indian market, but few now remain after the long period of warfare, and this year but five were despatched to the coast.

Leaving Shakra the road runs easterly along the southern side of a sandy strip and passes the town of Tharmida, still showing signs of the punishment meted out to it by Ibn Saud for taking sides against him in his struggle against his rival Rashid. As we reach the end of the sand on the left hand, the boundary of Woshm is passed and the premier district of southern Nejd, known as El Ardh, is entered. This district contains Riadh, the capital of all Nejd, and such other important places as Dereiya, Manfuha, and Arja.

As we left the Nefud, a ridge of blackish limestone hills flank the left of the route, precipitous in nature and 500 feet high over the plains. These hills end towards the south in a lone crag, while the road descends a long gravel slope past the village of El Burra and at last touches Jebel Toweik, towards which it has been gradually converging, This, the greatest of the ranges in Central Arabia, is formed of limestone. It stretches from Zilfi in the north, and divides the district of Sedeir from that of Woshm, and

leaves Riadh on the east. After this it turns south-west and touching the Wadi Duwasir, according to what the Arabs recounted to me, it reaches to Bishe and the western ranges of Central Arabia and the Hejaz. Thus its total length would certainly be between 500 and 600 miles. On its western side it appears as a white cliff like a wall from 600 to 1000 feet high, running out into projecting features, while its east slope is a gentle one, and loses itself imperceptibly in the surrounding plain. It is thus more a plateau with precipitous western slope than a definite range of mountains.

Our route was here joined by the pilgrim road from Mecca to Riadh, and we entered a gorge in Jebel Toweik which was filled with "sidr" and "talh" trees. After ascending this for 10 miles we reached the watershed and entered the head of Wadi Hanifa, here known as the Wadi Haisiat.

Eastward of this the valley slopes gently down again, having a width of 800 yards, the sides becoming gradually lower as we proceed. The road from Zilfi and Sedus joins in on the north. The bed of the wadi now becomes clearly marked, and at Ayane, a few miles further on, we found the remains of stone revetments of massive size, built to control the rush of water down the valley which occurs after rain. Ayane is a town which, with Dereiya, suffered from the fury of Ibrahim Pasha in the Egyptian invasion in 1818. It must have been a place of some size, as its ruins stretch for about 3 miles in the valley of the wadi. A little further on is the village of Malga, where Palgrave found the wadi dividing into two parts. As a fact, however, these two branches join again half a mile lower down, encircling a great mass of sand between them. From here continuous cultivation and date gardens extend along the bed of the wadi, while the ruins of old Dereiya appear on the right bank of the wadi, while the new village is on the left. This town, the ancient capital of southern Nejd, was taken by the Egyptians, the majority of the inhabitants were then slaughtered. The extensive ruins show something of its former size, which must have been very much greater than that of Riadh, the capital of the present day. Climbing out of the wadi, which was left to the south, and crossing a stony plateau 20 miles in breadth, the town of Riadh, the great capital of Nejd, suddenly springs into view, having previously been hidden in a dip of the ground.

This town, which became the capital of southern Nejd and the seat of the Wahabi kingdom after the destruction of Dereiya by the Egyptians in 1818, lies in a depression 100 feet below the surrounding plain, and, together with its suburbs and date gardens, stretches for 2 miles north and south, while its southern extremity touches the Wadi Hanifa, here known as el Batin. The town, which is completely embedded on three sides in dense date gardens, is also surrounded by a massive wall of recent construction with towers every few hundred yards, some of them commanding the various gates of entry. On the north-west is situated an extensive cemetery traversed by the great roads leading to Mecca and to Hasa.

Across the open plain Saleh and myself wended our way, both of us

in some doubt as to what the nature of our reception would be in this stronghold of Wahabism, recounted to us as the most fanatical sect of Islam in the world. Entering the town by a high gateway having iron-studded wooden doors, we passed through a number of quiet bystreets and then suddenly emerged into a broad square with a bazaar in which business was at its height at this the noontide hour of the day; as we passed through many curious eyes were fixed on us, and then we came to a large open space flanked on the right by a lofty castle, which proved to be the palace of Abd el Aziz ibn Saud, the Wahabi Emir of Nejd. We couched our camels and took our places on a mud bench running along the wall, while crowds of townsmen and slaves gathered round us, seeking tidings of the returning Meccan Haj, due in a few days, of which they thought we were the advance party. Many came and shook us by the hand as we waited; but finally the Emir's chamberlain arrived, and driving the crowd away led us into the palace, with a number of polite inquiries as to our health and the nature of journey. The first formality was to drink coffee in the public coffee chamber, through which passed a continual coming and going of palace attendants and slaves, all resplendent in embroidered cloaks and silver-handled swords. Very soon we were escorted to an upper hall overlooking the bazaar and the town, and here we were greeted by Abdul Aziz, the Wahabi Emir himself.

He is a man of about forty, 6 feet high and broad in proportion, with a strong though kindly face and the simplest of manners. He shook me by the hand and put me at my ease at once by the friendliness of his greeting, and a long conversation ensued on the news of the outside world, especially the Turko-Balkan war. Abdul Aziz regretted that his palace could not offer better quarters or more luxury, but said that since his arrival in Riadh ten years before, he had been incessantly moving about in desert parts of his territory warring on his enemies and endeavouring to consolidate the multitude of tribes under his control, and so had had no leisure to add to or improve his palace.

He gave me the history of his rise to power. It seems that some years ago during the reign of Muhammad ibn Rashid, the ruler of Hail, the most powerful of Shammar emirs, practically the whole of southern Nejd was wrested from Ibn Saud's hands, and Abd ur Rahman ibn Saud, father of the present Amir, took refuge in Koweit under the ægis of Mubarak, the sheikh of that place. In 1902, Muhammad ibn Rashid having died, the Shammar power grew weaker, and Abdul Aziz left Koweit with a following of only forty men, riding two on a camel, and made a dash across the desert to grasp the power again in Riadh. He reached the place, and leaving the camels in charge of two men outside the walls, the remainder of the party entered the town by night and made for the castle of Rashid's Governor. In the open square they happened to find an old woman, and discovered from her that the Governor did not inhabit the castle by night, but usually came there early every morning. They then managed to

effect an entrance into the castle and locked the great gate, leaving a small postern in it open. In the morning the Governor came with an escort, only to be cut down as he passed through the postern door, a fate which some of his followers shared. Abdul Aziz then went up on to a tower of the castle and proclaimed that Rashid's Governor had been killed and that Ibn Saud had returned. The townsmen immediately sided with Ibn Saud, and during the succeeding years of strife Ibn Rashid's men were gradually forced northwards until in 1910 peace was made between the two powers.

Although Abd ur Rahman, Abdul Aziz's father, is still alive and lives in Riadh, his subjects always speak of Abdul Aziz as the Imam or Emir, while Abdul Aziz himself speaks of Abd ur Rahman as the Imam. Actually the whole of the administrative power is in the hands of Abdul Aziz, while affairs of religion are dealt with by Abd ur Rahman.

During my stay in Riadh I was given lodgings in the palace, and all day long a stream of visitors entered and sat in my room, without exception showing me the greatest courtesy. At times I went into the town either with the Emir or with a slave he had ordered to look after me. For the most part the townsmen appeared civil and devoid of fanaticism, though occasionally an old man would ask the Emir why he thus entertained a Christian in the Wahabi town. To this the Emir would reply that any Englishman, Christian or not, was his friend, and dearer to him than many Muslims of other sects.

At the present time trade is extremely poor in Riadh. The town and suburbs are said to contain 25,000 inhabitants; this seems excessive, but I was assured that 7000 men attended prayer in the great mosque at the last 'Eed or festival, which would bring the total population up to the number stated. In spite of this the bazaar is a comparatively small one, while food and other articles are dear. The chief article of food is dates, certainly of a delicious quality. Many other fruits are cultivated, such as figs, apricots, melons, and brinjals, while clover is grown everywhere in among the date trees. There are few horses in Riadh and no cows or sheep. The Emir, who owns some hundred horses, keeps them at Kharj, a district two days to the south, where grazing and running water are to be had, of which there is none in Riadh. As far as I could understand from information given me by the Arabs in Riadh, the water-supply of Kharj is derived from springs. Palgrave, who visited the place, supplies no definite information on this point. There are no streams at all in Riadh, and all the irrigation is carried out from wells, in many cases 80 feet deep. The climate must be very healthy, and no great cold is experienced, as is evidenced by the townsmen's dress. This is extremely picturesque, and consists of a long white shirt reaching to the feet, having full sleeves that fall over the hands, below which they are slit. Over this a thin cloak of some dark material ornamented with a pattern in gold is usually worn, while the "kefie" or headdress formed by a kerchief on the head is almost invariably red, and kept in place by a gold "aghal" or ring of

camel's hair ornamented with gold braid in the case of the better classes. Silver-hilted swords and sandals complete the dress.

In view of the certain amount of splendour in this dress, it may be as well to recapitulate some of the tenets of the early days of Wahabism, which was actually a great Puritan revival occasioned by stress of circumstances. The use of tobacco was prohibited without reserve, as the plant was said to be directly favoured by Eblis or the evil one; the use of silken garments were interdicted to men altogether, while women were permitted to wear them only to a certain extent; poetry, music, and other amusements were condemned. Restraint was even put upon rice as a food, as it was not in use among the Arabs at the time of Muhammad, who cannot therefore have partaken of it, and there were other somewhat vexatious regulations.

Nowadays many of these former strict Wahabi tenets have been dropped or released; smoking, the greatest of sins in the eyes of the original Wahabi, is indulged in in private, and seldom a night passed but that one of the palace attendants did not visit me with a request for a little of the "shameful" as they call it. The mosques are still of a most severe and unpretentious appearance, with minarets seldom exceeding a few feet in height, as may be seen in the photograph. Attendance at the five daily prayers is enforced with the rod, and the bazaar is closed at these hours. The Emir is a most constant attendant at the prayers, and in addition for an hour at dawn and again late at night a metowaa or mulla reads chapters from the Koran to him in his private apartments.

I happened to meet in Riadh one Ahmed ibn Thanaiyan, son of a Riadh noble and a Circassian woman; he had been educated at Constantinople and spoke French well. He and other Arabs were always ready to volunteer information with regard to the geographical problems of the south, and arguments waxed furious in my room as to direction and extent of the great wadis there. There appears to be no doubt that the Wadi Hanifa, which passes close to the town of Riadh, after passing south towards Kharj, then divides, the left or northern branch running due east to the Dahana and losing itself there, while the right or southern branch keeps north of the oasis of Jabrin, carries here the name of the Wadi Sahabba, and eventually reaches the Persian gulf in the neighbourhood of Katar.

The Wadi Nejran is known in its lower course as Wadi Aftana, a fact about which there has always been much doubt, and it loses itself in the Ruba el Khali, or the great southern desert, while the great Wadi Duwasir, which rises on the eastern slopes of the plateau of Asir, also disappears in the same desert, and certainly does not reach the gulf. Though I met numbers of Bedouin from various tribes bordering on the great southern desert, such as men of the Duwasir, el Murra, and Manasir, none of them had anything to tell me about that great tract of desert, the Ruba el Khali. The majority simply called it the Nefud in a similar manner as they talk of the northern Nefud, and they did not appear to have any particular dread of it.

I could hear nothing of any routes across it leading southward towards the Hadramaut, and as a result of many inquiries I could gain no definite information except that it was a desert. They had not heard of the Hadramaut or any place across this great expanse of sand, and it also seems certain that there are no towns or inhabited places in it.

From Riadh down the Wadi Duwasir lies a route to Reniya or Bishe, to which latter place is counted eight days' fast travelling from Riadh. From a point in the Wadi Duwasir known as Saih as far as Reniya date plantations exist all the way. It cannot, however, be very pleasant travelling in those districts, as it was related to me that a woman will not look with favour on any man in the Duwasir tribe until he has killed seven men. Frequent mention was made in Riadh of the oasis of Jabriu, and it was stated that there are found in it the ruins of two ancient towns, while the extent of the whole oasis is about 10 miles in length.

Ibn Saud's jurisdiction is naturally bounded on the north by the state of affairs in relation to Ibn Rashid. On the south-east it extends up to and including the oasis of Jabriu on the south to the northern limits of the Ruba-el-Khali, while on the south-west it is limited by the districts of Bishe, Reniya, and Upurma.

Ibn Saud would not fall in with my wishes to continue my journey to Jabrin and the south, so after a stay of a week, I left Riadh for el Hasa and the coast. My companions were Bedouins from the four tribes, the Ajman, Duwasir, Beni Hajar, and el Murra. Naturally of an entirely different character to the fine northern tribes, these tribesmen of the south were not improved by the fact that they were returning from Mecca after performing the pilgrimage. Bigoted and fanatical to a degree, miserable in appearance, and capable of lying in a manner unknown elsewhere in Arabia, they did not prove the best of travelling companions.

This stretch of desert between Riadh and Hofhuf is peculiarly waterless, only one set of wells being encountered in the 200 odd miles to el Hasa. Leaving Riadh a stretch of gravelly desert is crossed for two days, then a lofty cliff called Urma stretching north and south for many miles is surmounted. In recesses in the cliff are several wells, some miles apart, the northern of which is known as Abu Jifan, and is the most frequented. My party, however, made for a southern well and watered at a "jelta" or pool of water collected in the rocks from recent rain. In a day from Urma the Dahana is crossed. The sand has a very different appearance to the Dahana of the north. The waves are small and the sand of little depth, and it is scarcely more than a sandy plain. It has a breadth of about 30 miles, and after crossing it a barren waste is met with, with little grazing and no firewood. The well marked Wadi Faruk is crossed, and the limestone hills bordering el Hasa are passed. On the eighth day from Riadh after marching very slowly we entered the town of Hofhuf, where I was most hospitably received by some of the Turkish officers.

Hofhuf is a place of some 30,000 inhabitants, of whom many are Wahabis,

and is surrounded by date groves and cultivation. There is the "kut" or walled city, within the precincts of which are the old castle forming the barracks of the Turkish garrison and the official residences. The bazaar or general market is usually held on the open plain outside the walls, and most of the trade of eastern Nejd passes through here on its way to the gulf.

The principal suburbs are those of Naatil on the east, where are some of the best houses, and Rufaa on the west, a group of poorer houses. The water-supply is exceptionally good for Arabia, and clear running streams are even to be seen in the gardens. This is due to underground water-courses which here come to the surface in the form of various springs, some of them hot when they leave the ground, and some of them salt and undrinkable. The same phenomenon occurs at Katif on the coast, where is a large group of date gardens watered by springs, while the several fountains and springs which come up at Bahrein, some on the foreshore itself, are well known. At Mobarrez, near Hofhuf, there is a group of seven hot springs used to irrigate fields of rice and wheat.

The oasis of el Hasa or Hofhuf extends for some distance from Hofhuf as a centre and contains several villages; it produces wheat, cotton, indigo, sugar-cane and many fruits, such as apricots, grapes, melons, figs, pomegranates, maize, and lucerne. The water from the springs is entirely expended in irrigating the gardens, but probably they could be more productively utilized. Some curious sandstone formations in the shape of pillars and dunes crop out at various points in the oasis, principally at Gittr.

Of the Arab tribes round Hofhuf the Ajman roam to the north of the oasis, while the Beni Hajar lie immediately to the south-east, with the Manasir farther south. The el Murra Bedouin are just to the south, with the Duwasir farther south. The most fanatical among these are some of the tribes in the neighbourhood of Katar, such as the Beni Hajar and the Duwasir.

The Turkish officers in garrison at Hofhuf received me most hospitably, but it was impossible to induce them to allow me to explore the country to the south, where I wished to penetrate. Leaving Hofhuf we crossed in one night the 40 miles of hopeless sand-dunes which separate this place from Ojair, its port on the Persian gulf. Although the country appears waterless, it seems possible at certain points on the route, by digging 2 or 3 feet in the sand, to obtain a certain supply of water. Caravans or travellers often take two days and halt usually in the desert. Ojhir is a small place, little more than a custom house, an old Arab fort, and a few buildings surrounded by the desert. The place is unhealthy and fever is common. There is a considerable caravan trade with the interior. From Ojair a native sailing boat was obtained to reach Bahrein; Christmas Day was spent in beating against contrary winds, and after a somewhat protracted voyage we finally anchored at Bahrein and I entered again the British Consulate.

# A JOURNEY FROM MYITKYINA TO SADIYA VIÂ THE N'MAI HKA AND HKAMTI LONG.*

By the late Captain B. E. A. PRITCHARD, Indian Army.

CAPTAIN PRITCHARD'S little party consisted of some orderlies from the Myitkyina battalion of the Burma Military Police, three of whom (*i.e.* two Gurkhas and one Kachin, the latter perhaps the best of the three) were with him from beginning to end of the journey. A Yawyin recruit accompanied him most of the way. One Ram Pershad accompanied him for survey work. In acknowledging the services of these men, Captain Pritchard acknowledges also, with gratitude, the assistance and advice of Messrs. Clerk and Hertz, C.S.I.

Leaving Myitkyina on December 19, 1911, Captain Pritchard caught his first glimpse of the N'mai at Seniku on the 22nd. Of the valley of the N'mai and the country generally, he says: "It may seem fanciful perhaps to liken the natural configuration of the country to the ribs of an enormous skeleton, yet that is just the impression one receives, not only here, but at many other points further up, from which a stretch of the river-valley can be seen. It is by an everlasting rise and fall over these parallel spurs or 'ribs' that the traveller makes his way beside the valley of the N'mai.

"The N'mai river is typical of the Burmese drainage system, which consists of streams flowing in a north-south direction in structural troughs, owing their origin to the series of meridional folds which constitutes the Burmese mountain arc. To judge from the character of the slopes on either side of the valley, the latest phase of the river has been one of rapid erosion, resulting in the steep fall of the lateral spurs from 8000 feet and more to between 4000 and 5000 feet, in the course of a mile or so. This appears to have succeeded an earlier phase—represented by the long east-

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* The following account is compiled from the notes of the late Capt. B. E. A. Pritchard, Indian Army, who was drowned last year in the Taron river. A man of superabundant energy and inexhaustible vitality, he coupled a keen sense of the humorous with a keen power of observation. His loss is deeply to be regretted. Into the circumstances which led to his undertaking a journey up the N'mai or eastern branch of the Irrawaddy it is unnecessary to enter here. But for eleven years he had been steadily preparing himself for this, and other exploration work, in Upper Burma. During that time he had acquired by long study, a mastery of Burmese, Yunnanese, Shan, and Kachin.

Very little still is known of the Kachin and Maru country lying north of Myitkyina. In 1890, Captain Elliot visited the country between the Mali and N'mai rivers, west of the Nsendaru ferry; and in 1895, Mr. Litton, Mr. Leveson, and Captain Lakin made a journey to the Chinese frontier near Hpimaw. In 1897, Lieuts. Pottinger and Lawrence proceeded some distance up the N'mai Hka, but, short of the A'mekh, were forced to turn east, up the Laking river, through the attitude of the tribes. With the exception of the exploration missions under Mr. Barnard in Hkamti Long, few other expeditions of note have been made in this part of the world.

west spurs sloping gradually from 8000 feet up to 10,000 feet—during which the gradient of the river-bed was less steep and the stream carved out for itself a comparatively broad valley. Owing, perhaps, to elevation in the Himalayan region to the north, the gradient was increased, with the result that the phase of comparatively slow erosion gave place to one of rapid deepening of the river-bed. This has led to the development of an extensive series of lateral streams on either side of the valley, some of which, especially among the east bank tributaries, appear to be of considerable size, a feature which may be due to the capture by a transverse stream of a river occupying a longitudinal valley parallel to that of the main river.

"As far as Pashé the actual valley of the river might be utilized as a line for a road. But beyond this point the spurs drop down too precipitously, *e.g.* at Kabap there is a fall of nearly 3000 feet in three-quarters of a mile down to the ferry. Here and there, on either bank of the river, and on almost every spur, a village is located, generally at an altitude of 3000 to 4000 feet. The whole valley is densely clothed with tree-forest and undergrowth, except where the land is under cultivation, or has, in recent years, been cleared. Near the larger villages the area thus cleared gives the country quite an open appearance. This cultivation is both above and below the villages. In the former case it is seldom at a higher altitude than 5000 feet, while in the latter case it not infrequently extends to within a few hundred feet of the river itself. A regular belt of forest marks the dividing line above which land is not cultivated, while below extend steep hillsides, more or less open according to the number of years that may have elapsed since clearing was last done on them. A grove of sago palms denotes the presence of a tributary stream, while on both banks the spurs appear to end abruptly, the more or less steep drop down to the N'mai being barely suggested to the traveller when at an altitude of 4000 feet. Villages are, on an average, about 3½ miles apart, though the distance in an air-line would be very much less. North of Hkrangkao, from villages and their vicinity, as well as from the river, snow-peaks are to be seen on the main ranges. Thus, from the spur beyond Kabap, as many as five snow-peaks may be seen in different directions, and most of these are visible from the Kulai ferry at the foot of the spur.

"To the traveller looking westward from the left bank of the N'mai north of Hkrangkao, the country across the river presents a very similar appearance to that in one's vicinity, except that the tributary streams are smaller, the drainage area being more confined. The villages are about as numerous, of the same size, situation, and at about the same altitude as those on the left bank, and the area of land under cultivation is about the same. The range dividing the Mali and the N'mai is irregular, but attains a greater altitude towards the north, being about 10,000 feet at Ngawchang, 12,000 feet at Pashé, and 15,000 feet at the A'mekh confluence."

FIG. 1.—TOP OF THE CHENGAW RANGE.

FIG. 2.—A TYPE OF NAINGVAW GRAVE.

In other places along his journey Captain Pritchard often refers to the country as being true to the type he has described here. On December 29, Captain Pritchard left Lauhkaung for Hkrangkao, which he reached on January 7, 1912. Here, with Ram Pershad and an orderly, he decided to strike east on to the Chengaw range to map in a stretch of the Salween-Irrawaddy divide, with the intention of striking north to Maghre and thence down the Laking river to the N'mai Hka. The party encountered severe weather. At an altitude of 12,000 feet and in 2 feet of snow the carriers deserted them. For ten days Pritchard tried to struggle on, but at length had to return to Hkrangkao, leaving behind him, in the snow, most of the kit he had taken. As a souvenir of this episode, his chilblains ulcerated, with the result that, for the next month, Pritchard had to walk barefooted. Of the country about Hkrangkao the traveller writes :—

" Sometimes as many as six crops were to be seen in one field, *e.g.* rice, ' lak maw,' millets, beans, etc. Glanced at casually, the crops looked good enough, but closer investigation revealed the fact that there was no grain in the ears. The country, in fact, was suffering from a total failure of the crops. In these circumstances the money earned by road-work is a God-send to the people. They have a curiously primitive system of insurance against famine, which is also in vogue among the Naingvaws. They plant sago-palms (*Caryota urens*, Linn.), which are never cut down until starvation is at their doors. These beautiful palms grow to a height of 70 feet, and are sometimes as much as 7 feet in girth. The pith, or farinaceous part of the trunk of old trees, yields a sort of sago, and so nutritious is it that so long as the trees last, famine is averted. I was unable to discover whether the natives are aware of the properties of the leaves, from which in India, ropes, brushes, baskets, etc., are manufactured. Nearer home the cord-like fibres from the interior of the stems have been used instead of whalebones, in corset-making, a fact I did not think it worth while to communicate to the Naingvaw ladies ! The men folk would have been more interested, perhaps, to learn that ' arrack,' or the gin of India, is made from the palm. Regular clumps of alder (*Alnus nepaliensis*) are to be seen hereabouts. These trees are planted by Kachins and Marus on taungya (hill cultivation), and when of sufficient growth are burnt with the rest of the taungya, yielding highly fertilizing ashes. This process is practised particularly in the more congested parts and reduces the cycle of years during which the fields have to lie fallow ; the normal term is seven to ten years. Horse-chestnuts are fairly common near here. Between Shichang and Myawjawng we left the track to climb a hill from which a splendid view of the N'mai valley was to be had, and from here too we had our first glimpse of the snows. Next day we saw the first of the cane suspension bridges, one spanning the Ngawchang, which the local Maru is an adept at constructing ; its length was 200 feet. At Kabap several Lashis, bringing dogs for sale, came into our camp. The Lashis are much more Tibetan in type than any of the other peoples met with so far. The

local Maru eats dogs. Near some of the villages here, a little tea was growing, and the country from here to the east could probably produce large quantities. Tea-growing and the extraction of minerals would seem to be the two industries by which the country might be developed. . . .

"A small girl died when we were at Hkrangkao, so a death dance was held. As usual with such people, the performance was monotonous. But the regularity of their movements, which consisted chiefly in bowing the head and bending the knees forward, at intervals describing a small semicircle with the left foot, would not have discredited a troupe of ballet girls. Three gongs beaten, 1–2–3, 4, 1–2–3, 4, provided the music. The Marus apparently burn their dead, except during the harvesting season, when they bury them."

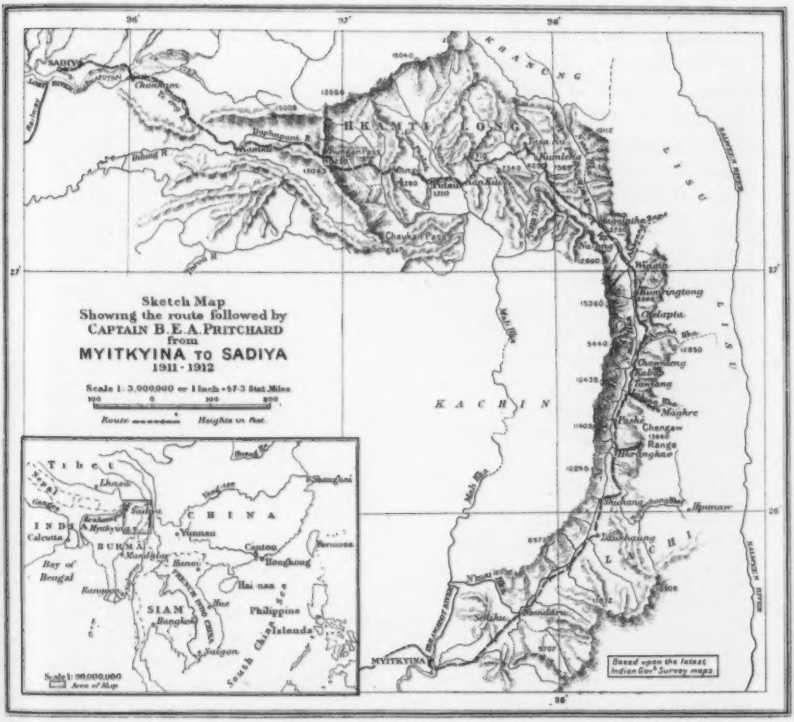
Getting fresh rations at Hkrangkao from the temporary post he had left there, Captain Pritchard, on January 19, left for Tawlang and the A'mekh confluence. Concerning the march north he writes—

"Never before have I experienced quite such severe ascents and descents without the shortest stretch of anything approximate to level. There is no relief on reaching the top of a spur, for the almost precipitous descent is just as difficult as the struggle up. The Naingvaws further north illustrate a difficult march by holding up one hand with the fingers vertically outstretched, and then running a finger of the other hand up and down over them, and this sign manual also aptly describes the country hereabouts. A day's march averaged less than 4 miles, and was yet quite good going.

"The people were quite willing to carry our loads for six annas a day or for a few brass buttons, blue beads, and other baubles, of which our supply was large. Their only objection was that accompanying us took them from their normal occupation of hunting for edible roots, etc., in the jungle; so, whenever a little rice was obtainable, I promptly purchased it and divided it among the carriers. The dearth of grain throughout the country was very noticeable. . . . The next day's march was again 3¼ miles, and at the end of it we camped among cultivated fields above the Mu (Lamu). The first hundred yards from this river took us up 200 feet of as steep an ascent as one is likely to meet anywhere, and was only compassed by hoisting one's self up from tree to tree by roots left carefully exposed for hand and foothold. . . . During the day's march I noticed several coolies cutting shavings off a soapy-looking tree, to be used, so they said, as a hair-wash, though I had some difficulty in believing that they were not in reality destined for the cooking-pot. To use a hair-wash regularly would be to deprive Marus and Naingvaws alike of their favourite amusement. . . . Again next day 3¼ miles to Pashé, including a descent of 3000 feet in 1¼ miles, the wet mud was as slippery as ice, and the only way to get along was to plant pointed bamboos in the ground ahead of one, and then slide down on top of them."

On January 31, Captain Pritchard reached Tawlang, which is a few miles north of the Laking river.

"The Laking river may be taken as the southern boundary of the Naingvaws, the border-line between them and other Marus. In this immediate neighbourhood there is naturally a certain intermingling of the tribes, but, generally speaking, the Marus up to this river are a homogeneous people, very similar in appearance, manners, and customs to the Marus of the Northern Shan States, with whom also I am familiar. Up




to the Laking only a small percentage of the Marus are addicted to opium, and I saw no drunkenness. . . . The Naingvaw young women enjoy the same privileges as their Kachin sisters, in that one room is set apart, and is known as the 'maidens' sleeping-apartment.' The parents never enter this room at night. High revel is held here with the young 'bucks' of the village, each lady having for her companion the youth of her choice. Conversation is kept up until the early hours of the morning, when most of them turn in in couples. This surprising freedom of intercourse is said, among the Kachins at least, to have one point in its favour, and that is that after marriage infidelity is rare. They are laughter-loving people."

Dealing with their ethnology, etc., Captain Pritchard writes—

"From Lauhkaung outpost up both banks of the N'mai the people are practically all Marus as far north as the Ahkyang junction. The Naingvaws are merely an isolated clan (of which there are about ten) of the Marus. The Laking valley may be taken as the southern limit of their territory, which extends up both banks of the N'mai to where they merge into the Khanungs or Nungs. In reply to questions as to where they originally came from, the almost invariable answer is, 'We have always been here.' Like the Kachins, the Marus are classified as Tibeto-Burmans. Most authorities, including the Marus themselves, say they are not Kachins. The Maru language is akin to Burmese, and quite different from Chingpaw or Kachin. But the Marus, however, mingle freely and intermarry with the Chingpaws. There are probably few places where the student of ethnology would be confronted with greater difficulties than among the Tibeto-Burman hill-tribes; this being the case, the traveller should avoid dogmatizing; nevertheless, some facts may be asserted without fear of contradiction. The Naingvaws are but one of the ten Maru clans. They are identical with the Khanungs or Nungs inhabiting the valley of the N'mai further north, and, except for slight dialectic differences, their language is the same. A study of their customs reveals the fact that these are almost exactly similar to those in vogue among the Kachins, and there is little doubt in my mind," says Captain Pritchard, "that they were originally the same people. Little reliance can, of course, be placed upon these people's accounts of their origin, etc., yet it is significant that the Naingvaws told me that if they went further down the river they became Marus, and if further still they became Kachins. The Maru genealogical table begins, 'Ah-maw-i married a monkey,' which somewhat discounts the value of their statement that they are not Kachins. Nor should one regard the difference in the Chingpaw and Maru languages, as some frontier officers do regard it, as conclusive proof that these are different peoples, for not only is the language test admittedly frequently misleading, but there is as much difference between Naingvaw and Maru as between the latter and Chingpaw."

Up to the time of this journey but little was known of the Naingvaws. Captain Pritchard therefore deals with them in some detail. He says—

"Their chief characteristic is low cunning. The men are avaricious, deceitful, untrustworthy, and excitable, but they are kind to their womenfolk; they are not nomadic. Hospitality to the extent of allowing the stranger to occupy their houses is a redeeming feature. The men are arrant cowards; they have no warlike instincts, and appear to be quite content to wear any yoke their more warlike neighbours see fit to put upon them. They are less addicted to strong liquor than most of the hill tribes. The women and children are neither suspicious nor afraid of the white man. They appreciate a joke and indulge in the hilarious

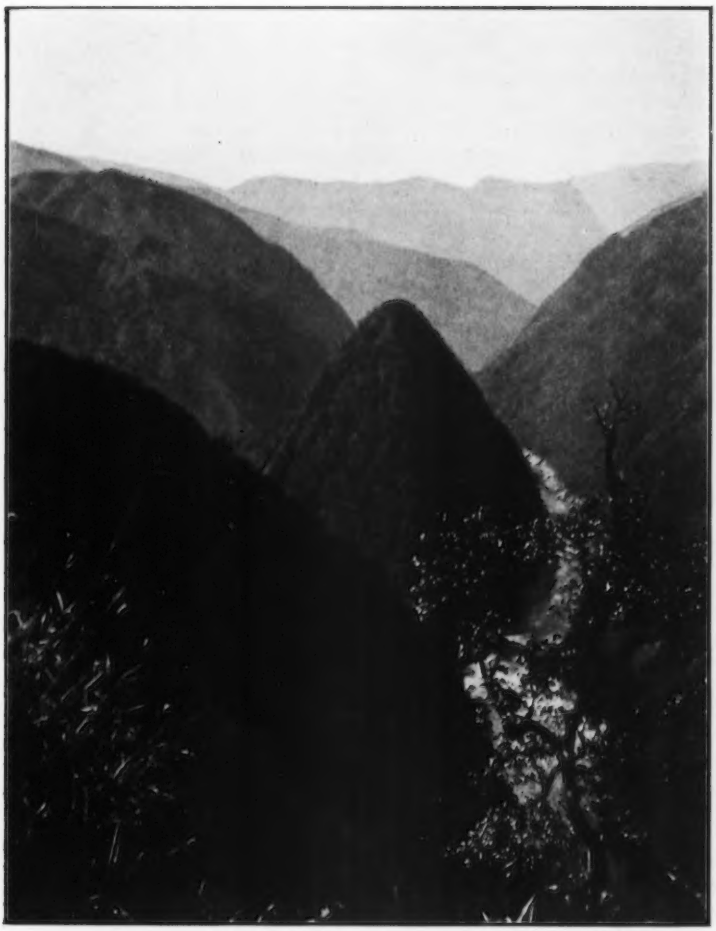


FIG. 3.—THE TWO CONICAL PEAKS AT THE CONFLUENCE OF THE N'MAI AND A'MEKH.

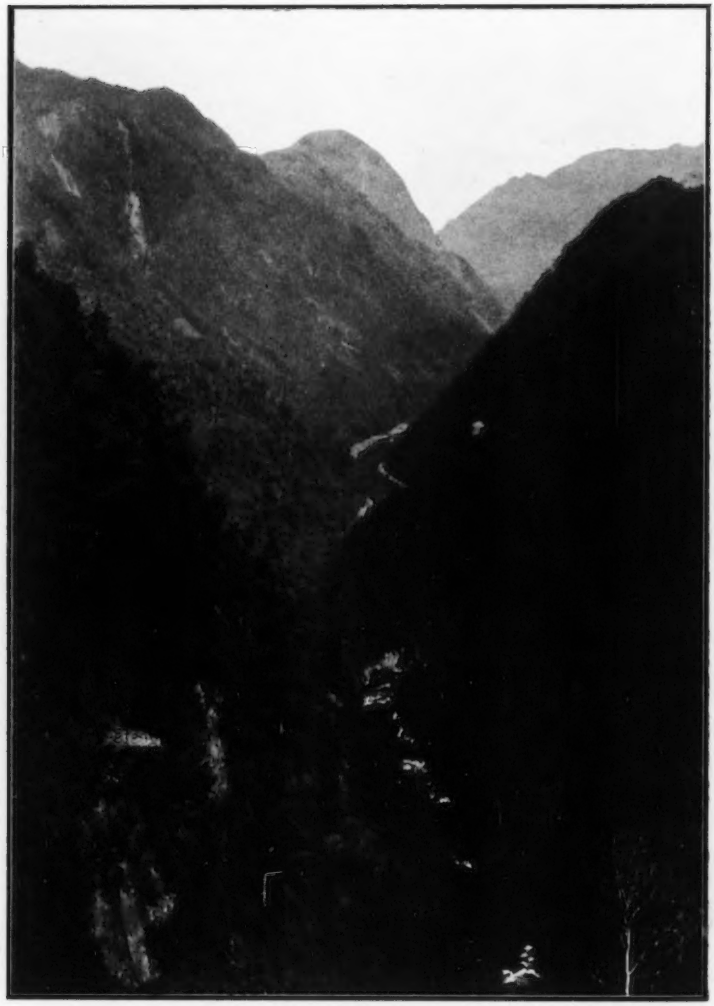


FIG. 4.—VIEW UP THE PASS BETWEEN THE TWO CONICAL PEAKS AT THE CONFLUENCE OF THE N'MAI IN THE MIDDLE DISTANCE AND A'MEKH (FOREGROUND).

laughter their Maru sisters do. Like most semi-savages, they are inordinately curious. The average height of the men is 5 feet 2 inches, and 2 inches more constitutes a tall man. The women are not very much shorter. The tallest man met with was 5 feet 7 inches. Though small, they are decidedly well-built. They are well-nurtured, but not physically strong, though able from constant practice to carry considerable loads in very hilly country."

In marked contrast to the more prevalent Mongolian type were a few individuals among the Naingvaws met with about the centre of their country. These possessed features of a decidedly Caucasian type, and the following description of them (based on Captain Pritchard's photographs) is furnished by Colonel Manifold, the well-known traveller in Western China :—

"The most marked feature separating them from the tribes around them is the straight prominent nose, which, except for a tendency to width at the nostrils, might almost be called Grecian. The lips, though somewhat unduly full, are well cut; the cheek-bones are not very prominent, and the face at this point shows breadth, and from the cheek, the curve to the chin, which approximates to oval, is rounded and well-shaped. The supercilious arches are prominent, giving rise often to rather deeply cut lines at the base of the nose. The eyebrows are heavy and thick, the forehead is somewhat rugged, and is surmounted by a mass of wavy hair, rather fine in texture, which falls in natural curls over the shoulders. The face is usually quite smooth, a somewhat large upper eyelid giving a perfectly well-curved aperture without the least tendency to obliquity of canthus."

Colonel Manifold says he has met this same type in the villages along the eastern tributaries of the Mekong. They speak a Tibetan dialect and belong to congeries of tribes known to the Chinese as Sifans. The limits within which they were found by Colonel Manifold extend from west of Ta Chien-Lu to the east of Batang. Colonel Manifold suggests the possibility of their being descended from the Græco-Bactrian race, who are said to have made an incursion into the north-west corner of Ssu-Chuan during the epoch immediately preceding the Christian era. In Captain Pritchard's opinion, it was, perhaps, equally possible that these people were the remains of some group of early Aryan invaders who made their way in advance of the general wave of Aryan invasion into this wild tract, and were left stranded among the surrounding Mongolian races, still preserving their characteristic physiognomy. In either case, it would seem that the occurrence of a group of such markedly European type in this part of the world deserves further study. Proceeding with his description of the Naingvaws, Captain Pritchard says—

"As with the Marus, further down the N'mai, there is a marked absence of naturals, cretinism, and deformities generally, as also of goitre. The appearance of the people testifies to the healthiness of the N'mai valley

between 3000 feet and 4500 feet, as well as to greater morality in private life, than is to be found amongst most of the neighbouring hill tribes. The dress of both men and women is exactly as worn by the Marus, except that practically all the women and a few of the men wear bamboo-tube earrings (like Kachins). Naingvaws intermarry with other Maru clans; men of one clan take wives from another, practising polygamy. Polyandry is not practised."

Naingvaw children are named, as with the Kachins, in accordance with their sex and the order of their birth. Their houses differ but little from those of Marus or Kachins, the piles on which the houses are built being, however, shorter, *i.e.* from 2 to 4 feet. Each house has four or five rooms or cubicles. In the front porch are partitions for pigs and fowls. Floors are of split bamboo, and each room has a fireplace. A granary is attached to each house. The Naingvaws do not object to strangers entering or leaving their houses by the back entrance, as do Kachins. The number of inmates of a house varies from two or three to as many as twenty, ten perhaps being a fair average.

It is possible that slavery is practised on a small scale among the Naingvaws, though they deny that it is so. Captain Pritchard could find no trace of it, but he adds that "the practice of selling people as slaves to the Kachins is rampant among the Marus in some parts of the N'mai valley."

The Naingvaw religion is apparently, if it can be so termed, the purest animism. They believe in *nats* and the necessity for duly propitiating them. Their various officers of religion are the same as with the Kachins. They have a priest (medicine man), a sacrifice slayer, a seer (who is supposed to have second sight), and a man who seeks out the *nat* which wants propitiating. They have no appreciation of who or what Karai Kasang (the Kachin term for the Lord of the universe) is, the few Naingvaws who have come in contact with Kachins only recognizing him, but rating him lower than the *nats*.

The Naingvaws are not addicted to opium, but all adult males and a small percentage of the women (though not children) smoke tobacco, generally in pipes. The tobacco is of good quality.

Hman is chewed and applied to wounds and eaten for fevers; it is the local panacea for most, if not all, ills. Its medicinal properties are well known, in Bengal, and every tribe from Assam or Burma to Yunnan values it highly. It is also interesting to note that Hman is valued by people so widely separated as the above tribes and the Red Indians of North America.

The Naingvaws are expert hunters. Some of their traps are very ingenious. Monkeys are caught by a device of bamboo poles held in position by slips of bamboo with maize as bait. On pulling the maize one pole is released, which lets free the lower one on which the monkey has been standing, and the animal falls to be transfixed on sharp "panjies" placed below. Fish are caught by ordinary nets, but in the more isolated

parts the mode of capture is to dam the stream with a framework of wood covered with brushwood. A hollow palm-tree about 25 feet in length is then laid with one end in the water and the other end on the dam, the slope being upwards. The fish, being unable to get through the dam, go up the palm and fall into a basket ready to receive them. The method is, says Captain Pritchard, very effectual.

The Naingvaws improvise most of their songs. One man, ranking higher than his fellows as a singer, renders a solo, the others joining in a long drawn-out note which serves as a chorus. None of their stories or songs are printable. Their version of the "fall" is that the original two were brother and sister and that the sister was to blame—and beyond that it is unsafe to go! They also have a version of the Tower of Babel, which finishes "and so one man reached out and seized the moon, when the N'mai gushed out and all was dark."

Leaving Tawlang, Captain Pritchard proceeded to Chawnteng, which he reached on February 5, and to Shija, where he arrived on the 10th. Within a quarter of an hour of his arrival at the latter place, all his coolies decamped without pay. But, to make up for it, they stole several things. Here he had the greatest difficulty in obtaining other coolies, and was delayed several days. He utilized the time in compiling a glossary of the Naingvaw dialect and in visiting the place on the A'mekh where the Lisus dig for gold, but he only saw it from the far side of the A'mekh. The gold is apparently alluvial, though nuggets varying in size from a pea to a bean are said to be occasionally found. One fact he elicited, *i.e.* that the Chinese never use the A'mekh route.

By taking *rough* cross-sections of the rivers N'mai and A'mekh at their confluence, Captain Pritchard worked out the comparative volumes of discharge of the rivers to be—

| | |
|---|---|
| N'mai ... ... ... ... ... | 10,755 cub. secs. |
| A'mekh ... ... ... ... ... | 1,655 cub. secs. |

From this it will be seen that the N'mai is rather more than six times as large as the A'mekh, and the latter river is therefore only an affluent of the former. Until recently it was commonly supposed that both were rivers of about the same size, combining to form the eastern branch of the Irrawaddy. This theory Captain Pritchard therefore effectually disproves.

The utmost tact, and the promise of his mackintosh to the local headman if ten of his people would carry for him, only made Pritchard so popular that they begged him to stay for a month. It was not until a show of force was made, coupled with a promise not to visit the gold reef, that Pritchard finally obtained sufficient carriers to take him northwards. On February 18 he started up the A'mekh. He remarks that the valley of that river closely resembles that of the N'mai, the spurs being as frequent, as steep, and equally as impossible. The spurs run up to snow-clad heights of 15,490 feet on the Laking-A'mekh divide, and to 14,720 feet on the

A'mekh-N'mai divide. Jungle extends, he says, from the top of the divides to within a few feet of the river, the greater part of the existing cultivation lying between 5000 and 2500 feet.

On the 27th the party reached Chelapta on the N'mai, marching part of the way in thunderstorms, which only allowed them "glimpses of great mountain ranges."

From Chelapta onwards the path was most difficult. It took six hours to traverse 4 miles, the first 2 miles of which was mostly along a steep rock face. Where the path was horizontal, more or less, it consisted of one or two bamboos, either fastened to trees or hung along the face of the rock. Where the path ascended or descended, notched logs were set up against the rock, or sometimes a bamboo pole was fastened to a stake driven into the rock, with the aid of which the party had to swarm up or down the cliff. In the second 2 miles the path traversed dense jungle of tall *Kaing* grass, through which they had to burrow. At the end of this march they camped in the jungle, a procedure which did not recommend itself to the Chelapta coolies, who demanded heavy wages before they would agree to go on. Next morning the mists began to lift at 6 a.m., and until 9 a.m. large drops of water fell like rain, making the jungle damper and the path more slippery than ever. Later on, rain fell, and it took nine hours' hard going to cover the next 5 miles into Kumringtong.

Captain Pritchard was still walking barefooted as the result of his ulcerated chilblains, which prevented him getting on his boots, but he fell fifteen times in half a mile and twice "plunged literally headlong down the hillside." The sun's only appearance was for one minute at about 4 p.m. The party could not even see across the N'mai, so that survey work for that day was impossible. The track in one place rose 1750 feet in three-quarters of a mile, and the only means of progression was to send two men in front to plant bamboos in the ground, by which the rest of the party could pull themselves up.

It is no wonder that with the main tracks of this description the people are not "nomadic." In talking of these tracks, Captain Pritchard says—

"A double line of bamboo sticks high up on the hillside may be taken as an indication that a descent is imminent. These sticks have assisted Naingvaws to climb up from the other side, and are stuck in the ground when the climb is over, as no longer wanted. Probably much the same feeling leads the Naingvaws to make this bamboo alley, as prompts the European to make a stone cairn on the summits of high hills."

On this march a lad accompanied Captain Pritchard who described himself as a Pashé Lagu and not a Naingvaw. He was sixteen years old, and had been a slave in Kachin country for two years. His people had sold him originally for a coat and cooking-pots. He had nothing but good to say of his Kachin owners, and was found to be most useful, probably because the two years away from his own people had enlarged his mental

FIG. 5.—ON THE BANKS OF THE NAM HKAMTI RIVER.

FIG. 6.—SHAN WOMEN OF HKAMTI.

horizon. Pritchard asked him why he did not run away from his Kachin masters, and he replied that, in the first place, he had no wish to do so, as he was very well treated; and, in the second, his own people who had sold him had told him that they would sooner or later buy him back.

Leaving Kumringtong, the party reached Wingin on March 4, where Captain Pritchard mentions several fine waterfalls. On March 5 he visited the Ahkyang *tuk* or confluence in order to take a cross-section of the rivers. He found the N'mai above the confluence to have a maximum depth of 71 feet, with a depth of 51 feet within 1 yard of the right bank, the river being about 70 yards broad. The Ahkyang he found to be about 30 yards broad at the junction, but owing to the rapids he was unable to obtain a cross-section. His attempts to do so were much hindered by the Naingvaws, who were afraid of rousing the ire of the river junction *nats*.

From the confluence the Naingvaws reported the Salween as being six days distant, the divide being crossed on the third day by the Wahkyet pass. But, as Captain Pritchard points out, this probably means six days for a native doing two or three stages daily. Another pass across the divide was also mentioned—the Tsaptse.

On March 6, owing to the threatening attitude of the Lisus on the left bank of the N'mai, Captain Pritchard crossed to the other side. The party was followed, but not molested, by some few Lisus, and reached Na-cng on March 10.

Concerning these Lisus, the traveller says—

"After passing through a succession of Naingvaw villages, to come suddenly upon a Lisu one, is like being translated to China, for the men have adopted the ordinary Chinese black skull-caps or blue turban, and blue coat and trousers. Both sexes of all ages wear short, untidy queues, and, though not a man of them knows Chinese, there is an obvious admixture of Chinese blood in them. Long hempen overcoats are worn, and bags of lungoor, cat, cow, and other skins are the fashion. Curiously enough, they have the same names as the Naingvaws, *e.g.* Adu, Achung, etc. Both sexes are handsome, but there is a low and evil-looking type—less like Chinese—as well. The average height of the men is about 5 feet 9 inches. Some of the women had navel-cords of their children tied round their necks by a hempen cord, like a pendant brooch—probably as amulets. The women wear a double row of white buttons round the head, from which one-inch strings of beads and seeds hang in a fringe, terminating in a tiny metal bell. They also wear bone ornaments round the head and on the straps of their skin satchels. Their earrings are of silver, with a piece of coral (?) attached. These rings are sometimes 4 inches in diameter. The headdress is picturesque. The men all carry the formidable Lisu cross-bow, and the boys have miniature ones. Their swords are 4 feet long, of which the blades are 3 feet, and are ill-balanced and not as formidable as an ordinary Kachin *dah*. While both sexes are particular as to their dress and comparatively cleanly in their persons, it is curious

to find their houses rickety, draughty, small, and dirty. They are built on piles of varying height, and have only one partition in them.

"During the last twenty years, the Lisus have driven many Naingvaws from the N'mai (about lat. 27° 25′ N.), and do not allow them to reside there or on the road to Kumleng. Some of the evicted went to the west of the Mali-N'mai divide, others into China. A wooden banjo of the ordinary Chinese type is the only musical instrument."

He goes on to say that the hundreds of Lisus who come to dig for gold annually near the A'mekh river junction, bring metal cooking-pots and blue Chinese coats, which they exchange for such provisions as the local villages can muster, consisting generally of rice, eggs, and a small quantity of salt. The Naingvaws deny that the above commodities are given as tribute, and state that the interchange is by ordinary barter.

Moving again on March 11, Captain Pritchard found his road along the bank of the N'mai, here 120 yards broad. The weather being excellent, the party reached Magalatha on the 12th. He notes the quantity of temporary shelters along the route, and deduces therefrom that the road is fairly frequented. The party halted a day at Magalatha to recruit coolies for the six days' march along the jungle track to Kumleng, which was the next village. Leaving again on March 14, Captain Pritchard writes of the march on the 17th and following days—

"The brain-fever bird and the cicada were here to deafen us with their noises and to remind us that we were nearing the plains. Our next march was through dense jungle, the dampness of which seemed to suit insect life of an unpleasant nature. Enormous ticks, blood-blister flies, and leeches combined to give us an unrestful time. The march to our last jungle camp had all the entomological disadvantages of the preceding one, but we got about twenty pounds of fresh fish, caught in traps by villagers from Kumleng. The Ratnamhti (Nam Tisang) would afford good sport to the angler. We saw some duck going down the Ratnamhti river and heard several barking deer. This was a great change after the scarcity of animal and bird life experienced so far."

At Kumleng the party entered the territory of Hkamti Long, or "great gold land."

From Kumleng Captain Pritchard made a *détour* to Tasah Ku to pick up 600 pounds of rice which, with great forethought, Mr. Barnard had sent for him from Hkamti, and here he parted with the Magalatha coolies. Obtaining fresh ones, Captain Pritchard reached the Shan village of Kan Kiu on March 27. Leaving his kit and party to go by boat up the Mali Hka and Namphalak, Pritchard walked in from Kankiu to Putau to meet Mr. Barnard, and to get the latest news from home.

On the stage from Tasah Ku he noted that the Nam Tisang, where he crossed it in lat. 27° 30′ N., was 200 feet wide and fordable, whereas the Nam Kiu, in lat. 27° 23′ N., was 166 yards broad and 20 feet deep. The traveller mentions this particularly, as Errol Gray made the curious

FIG. 7.—KACHINS AT KUMKU.

mistake in his diary (as printed in *Geographical Journal*) of saying that the Nam Tisang was somewhat larger than the Nam Kiu.

Owing to the ever-present difficulty of obtaining coolies in Putau, Captain Pritchard changed his quarters to Manse, where coolies were reported as being quite ready to take him anywhere he wished to go. His idea was to take the N'Lulong road into the Hukawng valley and return to Burma by the Chindwin, and the coolies were agreeable. But they made the proviso that they were not to be blamed if they were unable to find their way, as it had not been traversed for fourteen years.

Further accounts of the N'Lulonglam decided Pritchard. He changed his mind, and determined to go to Assam by the Phungan route. It was with great regrets that he did so. His desire was to visit the Tamai and Taron streams, and he adds, "I trust I shall be allowed to make the attempt later." This he did in 1913, and it was in the Taron that he met his death.

Of Hkamti Long Captain Pritchard writes: "The Hkamti Shans and their country have been eulogized by most travellers, who have naturally been delighted with a people so civilized, after journeys where Kachins, Kahnungs, and Lisus have been met with, while the country is a land 'flowing with milk and honey' compared to the more or less barren land one traverses to reach it. But, regarded as a remnant of the once great and powerful Tai kingdom, the people do not impress one so favourably. They are a decaying race, and the country might produce much more and a much greater variety of crops than it does. The 'great gold land' is indeed a fertile one, with great possibilities. What it most requires is a population, and this requirement will probably be met only when a railway pierces the Hukawng valley, bringing with it natives of India. An examination of the history of the Shan race will reveal the fact that their present marked characteristic, a social disruptive tendency, has always been their weak point. Such political characteristics have made a permanent mark on the history of most nations. Thus the Slavonic inability to recognize that a minority must give way to the wishes of a majority leaves its traces alike in the *liberum veto*, which was the ruin of Poland, and in the methods in which a Russian *mir* transacts its business to-day. The Nanchao rulers of Tali Fu were the head of a great nation, and at one time extended their domination over Yunnan, part of Ssu-chuan and Kwanghsi, northern Burma, and a portion of Assam, as far as Oudh. But, owing to their tendency to follow tribal rather than national interests, they could not hold what they had grasped, and finally succumbed to the onslaught of Kublai Khan and the Mongols. The centre of Shan political influence then shifted from Tali Fu to Meng-Mao, when the Mao Shan branch for a long time exercised a great influence over the political destinies of Siam and Burma, till, in 1562 A.D., their power was taken by the King of Pegu and their kingdom reduced to vassalage. Enough has been said of the political history of the Shan race

to throw light on the present situation at Hkamti Long. Its seven *sauhpas* are in constant disagreement with one another; and the feuds which arise from this cause are bound, sooner or later, to effect the disruption of the state of Hkamti Long."

As an instance of this jealousy which exists between *sauhpas* and their followers, apparently all villagers from Putau use the Chaukan route, and all from Manse the Phungan route, in their journeys to Assam. The route to the Hukawng valley, for which no guide was to be obtained, is *viâ* the Songshan, and therefore, says Pritchard, Young is "in error in stating that the Chaukan route is in disuse and the Songshan one frequented."

On April 6 the party left Manse, proceeding westwards. The next day they met a party of six Putau men, who said they had taken twenty-two days to come from Kamku. Says Pritchard: "One has to be a philosopher or have the *wanderlust* strongly developed to appreciate travelling in the Burma-Assam jungles. An ill-defined track, much overgrown and obstructed by fallen trees and bamboos, even the standing trees coated with moss; a carpet of wet dead leaves under foot; the continual swish of bamboo and undergrowth in one's face, despite the crouching attitude adopted—all this, combined with the gloomy, dark jungle, tends to cause a sense of depression, which is scarcely alleviated by a very occasional glimpse of the sun. The mist everywhere hides all but one's immediate neighbourhood. The slow pace of half a mile an hour, which is all that the coolies can, or will, make, heightens the resemblance which their carrying baskets give them, to gigantic snails crawling through dense forest. Some variety is lent by an occasional mile or so of a snow-fed stream, where at first one jumps from boulder to boulder, where possible, but after getting soaked to the waist these aids are abandoned in favour of wading. Over all is rain—rain in the morning, rain during the day, and rain at night. To light and keep a fire going is a work of art. It would occur to most people to shave wet wood to get dry timber, but the fact that dead hanging creeper is preferable to the dead wood may not be so widely known. . . . Though the standing trees are not blazed to show the path, one cannot go half a mile without coming across a fallen one over which the track lies. These are invariably slashed with *dahs* to give a better foothold, and were one to come across two or three in succession ungrooved, one might safely conclude one had left the track."

On April 11 one coolie refused to go further. Rain poured all day, so that the crossing and recrossing of the Nam Pangan (which occurred three times) was no easy matter. There was only one cane rope bridge. It consisted of a single cane rope, with two or three loops of cane about 2 feet in diameter, hung round it. The traveller sits in the loops and works his way along below the cane rope—no easy matter apparently, and Captain Pritchard did not attempt it.

The Pangan (Phungan) pass was crossed on April 17, the actual crossing being easy. Three hundred paces down the pass the party came across

melting snow forming a trickle, which was the headwaters of one of the four main branches of the Daphapani. Half a mile below the pass they left the actual path, and, following the track of a musk-deer, struck the main range near where the Dihing-Dapha divide joins the Chaukan-Pangan range. The divide was rich in both tree and ground orchids, while the rhododendron trees were covered with white flowers. The average width of the watershed was about 5 yards. Very little could be seen of the actual waters of the Dihing and Dapha, but their course was very plainly marked out by the dense mists overhanging them. The jungle was full of game, and the animals' "roads," says Captain Pritchard, "compare favourably with those used by humans."

On April 22, about Kamku, he again mentions the quantity of game, and that the elephant tracks were a good deal better than the track he was following. Despite the quantity of game, however, he was unable to get a shot, owing to the thickness of the jungle. He also mentions some sulphur springs, to which, he said, "animals seem to resort as salt-licks." The Dapha he found to be then running in three channels, but even so it took him 650 short paces to cross to Kamku.

In his last march to the Dapha, he found a nest of fifteen leeches in one boot, which was, of course, full of blood, but he says his plight was better than that of his carriers, many of whose leech-bites had developed into wounds, "having been regularly scratched and never washed."

The party left Kamku on April 25, passing through several Mishmi villages, the people in which seemed much interested in, and not a little afraid of, the travellers.

On the 28th Captain Pritchard took to a dug-out on the Te-eng, floating down with the headman of Chonkam's son Chowna. Both Chowna and his father Chowsam had travelled with Cooper, Needham, and Williamson, and had much to say of their travels.

On the 29th, as the sun was setting on the Abor hills, the party reached the Dihing Mukh and shortly afterwards found themselves on the wide stream of the Lohit Brahmaputra. Next morning they reached civilization at Sadiya.

"It was not," says Pritchard, "without a feeling of regret that I found myself buying a railway ticket instead of persuading or bullying reluctant savages to act as my porters. The charm of these wild surroundings remains with one always, and will not cease to call one back to the rushing torrents and the lofty mountain ranges which are encountered ere the goal is reached where the Great River of Burma has its birth."

# THE EVOLUTION OF A CAPITAL. A PHYSIOGRAPHIC STUDY OF THE FOUNDATION OF CANBERRA, AUSTRALIA.*

By GRIFFITH TAYLOR, B.Sc., B.E. (Syd.), B.A. (Cantab.), F.G.S.,
Acting Commonwealth Geologist.

C. *Physiography. The Evolution of the Canberra Topography.*

(*a*) *Pre-uplift Features.*—In an earlier article on the physiography of the Lake George district I have endeavoured to find the age of the fault scarp (Cullarin range), which dammed back the lake, by estimating the amount of silt deposited in the enclosed basin. The method was rough but the result is, perhaps, as near the truth as could be expected with our very incomplete knowledge. The fault is dated at approximately fourteen thousand years ago. Probably this is too recent, and twenty or thirty thousand would be a better estimate.

The country to the east of Lake George consists of broad valleys, with moderately high hills projecting 700 or 800 feet above them. Much the same topography is met with around Canberra, with, however, more alluvial deposited in the form of broader plains. And again, in the Paddy's river area, the topography exhibits the same features, though a narrow gorge excavated in the lower portion of Paddy's river valley shows where some factor (a relative uplift) has led to increased cutting powers of the water. We deduce from this that the last cycle of topography reached a fairly mature stage. It had not quite cut the country down to a new peneplain level, though only the knobs remain at Canberra.

(*b*) *The Canberra Tilt Block.*—Now, supposing this "late mature" landscape were effected by earth adjustments in the form of two huge sub-parallel faults (see Fig. 9) in such a way that the block between the faults tilted appreciably, say 300 feet, the western margin sinking and the eastern margin rising by that amount, we should get the structure shown in Fig. 9. The headwaters of the Yass river—if they could not cut down through the fault scarp as quickly as the latter rose—would be cut off and form a lake. Such has happened, and Lake George is the result; while the older watercourse, with large rounded boulders, is to be seen near Geary's gap, perched several hundred feet above the lake. Many other interruptions might be expected. For instance, as the fault scarp lies about 15 miles west of the old Main Divide, it is probable that the headwaters of the Lachlan have also been cut off (Fig. 10). The lakelets of the Breadalbane plains may be relics of the Lachlan system, and so also the curving headwater of the Wollondilly. The latter seems to have captured the upper Lachlan to make up for the huge tributary annexed by the Shoalhaven, which it used to receive from the south. These changes are shown in Figs. 10 and 11.

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* Continued from page 395. Map, p. 480.

On the sinking side of the tilt-block it is natural to find a large river. We should not expect this at Lake George, for here the fault practically coincides with the main watershed. But 40 miles from the Divide a large amount of drainage would be deviated into the new valley, the middle Murrumbidgee, for this would form a rapid "get-away" due north. Not only would streams which formerly ran into the lower Murrumbidgee be deflected somewhat, but also the headwaters of the system to the south might be expected to be influenced. We have seen that this is so from the numerous "boat-hook" bends of the Gudgenby and Murrumbidgee (see Fig. 8). The most gigantic "boat-hook" of all is the whole upper Murrumbidgee, near Cooma (see Fig. 10). If these rivers have changed their course so greatly, other phenomena besides the change of direction ought to be present. The Murrumbidgee fault valley is, from the tributaries' point of view, equivalent to a definite lowering of their "base-level." In other words, it has the same effect as an uplift; so that we get a renewal of cutting force, or a

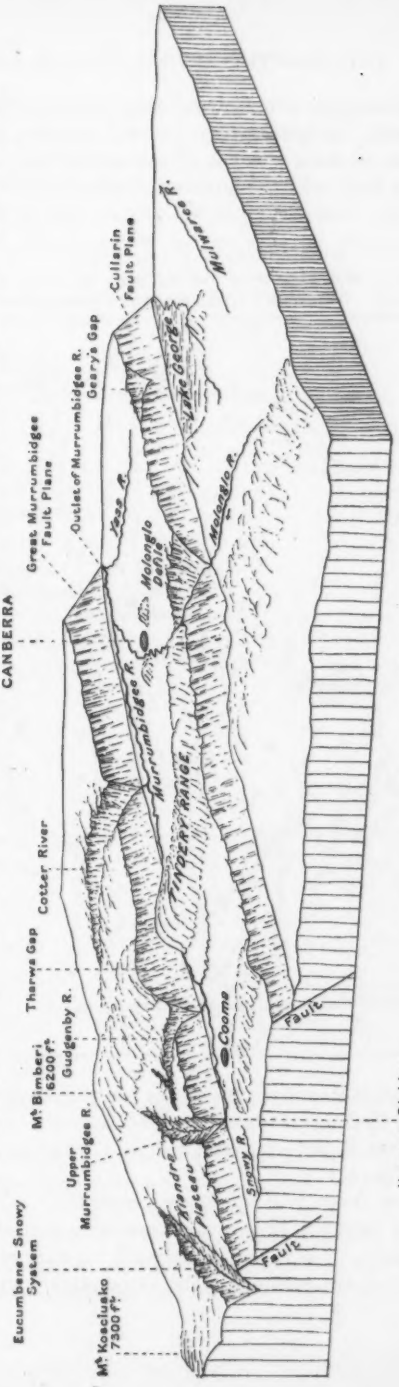
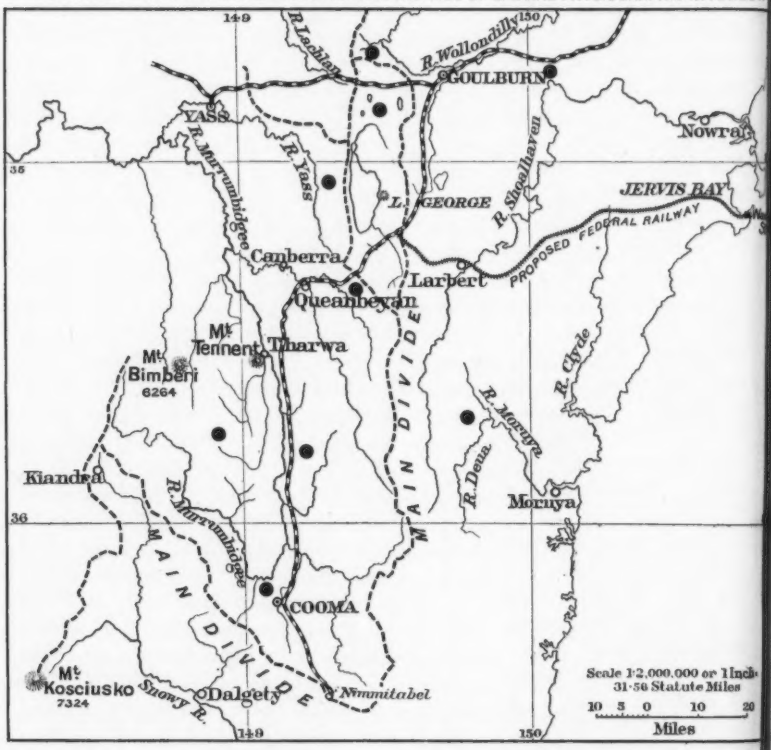



FIG. 9.—BLOCK DIAGRAM OF THE FEDERAL TERRITORY.

rejuvenation, as it is technically termed. This gives rise to the narrow "young" gorges—several hundred feet deep and not much wider—which mark the lower portions of the Cotter, Gudgenby, etc. (There may also have been uplift, and, in fact, another tilt-block to the west.)

We have seen that the Divide used to lie where the knot of high mountains intrudes on the Murrumbidgee valley, near Tharwa. The

FIG. 10.—SKETCH MAP OF THE PRESENT DRAINAGE OF THE REGION SURROUNDING THE TERRITORY. THE BLACK CIRCLES INDICATE LOCALITIES OF SPECIAL PHYSIOGRAPHIC INTEREST.

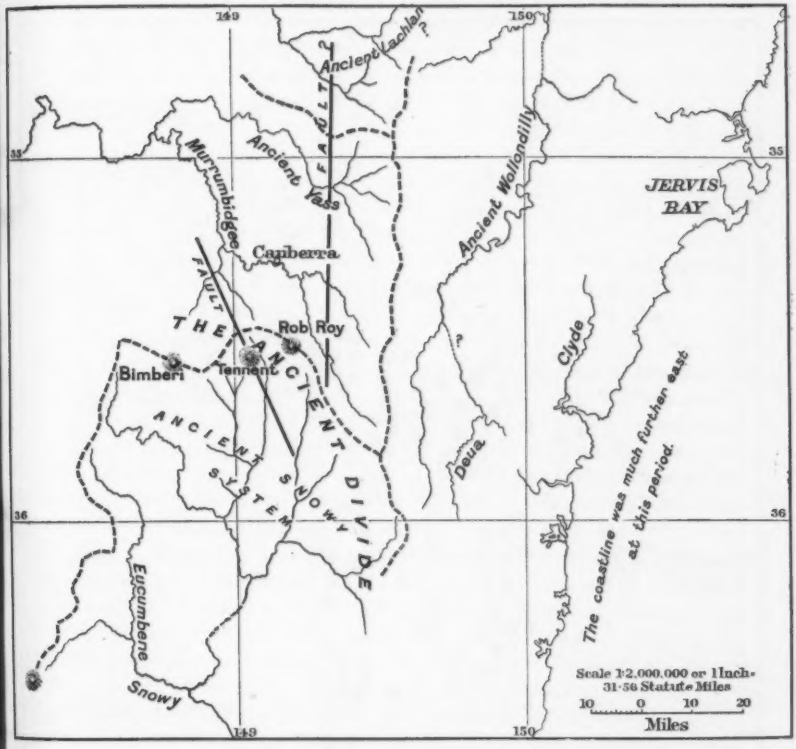



Divide is now 60 miles to the south, between Berridale and Cooma, but the clashing between the two systems—the Murrumbidgee and the ancient Snowy—has resulted in the interesting "cross-fork" contours of Tharwa.

(c) *Rivers of South-Eastern Australia.*—A word or two on the general river evolution in this south-eastern region of Australia may not be out of place. I have not investigated the very rough country in the extreme west of the territory. The extraordinary valley of the upper Cotter is

quite possibly another parallel fault plane. Indeed, the Goodradigbee, Tumut, and Adelong rivers, may all have been determined by folding or faulting in accord with the general north-south trend of the rocks in this area (see Figs. 10 and 11). The sudden bend of the Murrumbidgee to the west, near Yass, probably indicates where the river leaves the uneasy

FIG. 11.—THE ANCIENT RIVER SYSTEMS, BEFORE THE PERIOD OF EXTENSIVE FAULTING AND FOLDING WHICH LED TO CAPTURE AND REVERSAL IN MOST OF THE RIVERS, AND MOVED THE COASTLINE CONSIDERABLY TO THE WEST.

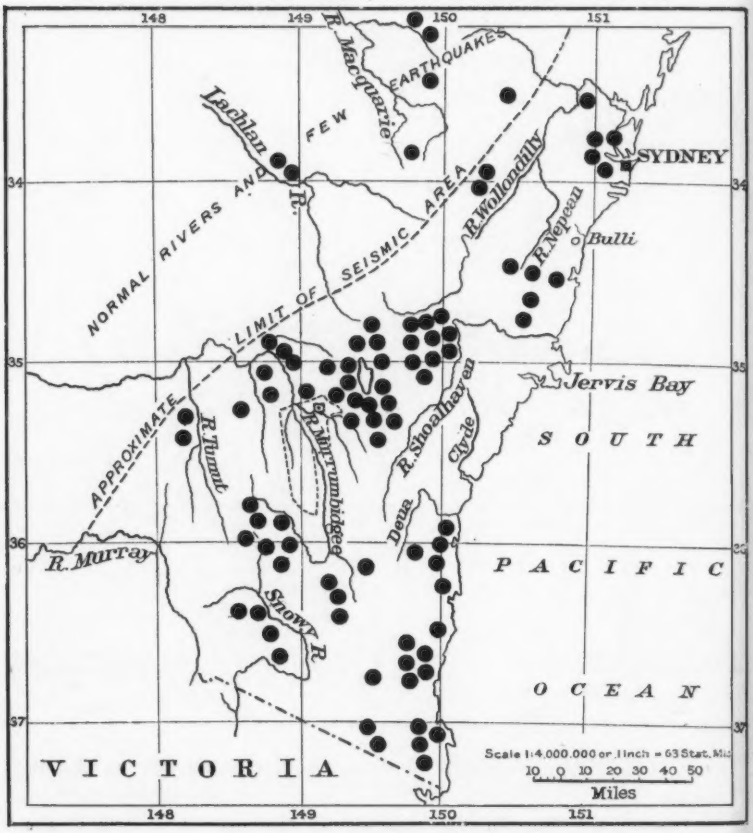



crust of the Monaro highlands for the comparative solidity of the western flanks.

Leaving the Murrumbidgee and Snowy systems, let us look at the coastal streams. Notice the Deua and the Shoalhaven, and, to a less extent, the Wollondilly-Hawkesbury. They flow north along large valleys, and then near the mouth suddenly bend to the east. The Clyde also has this feature reversed (Figs. 10 and 11). Evidently the main drainage is north and south, and the east-west mouths are later features. Even the proposed

federal port, Jervis bay, is probably a relic of one of these north-south valleys; but in the case of this one, most of it has vanished before the waves. The two headlands are more or less isolated from the mainland, being joined by rather low and narrow isthmuses.

FIG. 12.—MAP CORRELATING THE CHIEF SEISMIC AREA OF NEW SOUTH WALES WITH THE ANOMALOUS RIVER EVOLUTION OF THE REGION. EACH BLACK DOT (COPIED FROM A MAP BY THE COMMONWEALTH METEOROLOGIST) REPRESENTS A SEISMIC SHOCK.




Are there any other phenomena which throw light on this curious distribution of irregular river systems? Why do not the eastern rivers show the normal branching and regular shape of the lower Lachlan and Macquarie—with tributaries uniformly spread over the country so as to carry off the drainage in an orderly and economical manner? See how

closely the eastern rivers are packed between Lake George and the Murray (Fig. 12). It is as if every subscriber to a telephone system required a separate trunk line. I have elsewhere put forth a "law of physiographic symmetry" whereby I try to show that marked deviation from a uniform and economic system of drainage is to be correlated with striking and comparatively recent tectonic movements.*

(*d*) *The Seismic Area.*—I think the earthquake map of New South Wales, to which the Commonwealth meteorologist drew my attention in connection with the Canberra faults, undoubtedly helps to explain the anomaly (see Fig. 12). Some vast earth-building (tectonic) forces have robbed New South Wales of a great slice of her coast-line, quite lately in geological time. The change in the main drainage is evidence enough of this. For instance, observe the way the Nepean river (near Cataract dam) rises on the very edge of the 1000-foot sea cliff at Bulli. The other slope of its watershed has vanished beneath the waves (see Fig. 12).

It must not be supposed that these earthquake shocks (shown by black dots on Fig. 12), experienced during the last fifty years or so, are of a very violent nature. They merely mark a re-adjustment of crustal stresses. Probably many small shocks, with quiescent intervals, gradually led to the elevation of the Canberra tilt-block. The fact that the Molonglo could cut through the scarp while it was rising proves this. But the whole of the topography of this corner of New South Wales proves that the history of the area has been a very troubled one in late geological time.

(*e*) *History of the Topographic Cycle.*—Possibly the history was somewhat as follows: a continued period of rest led to the production of a peneplain of an advanced type—now represented by the 3000-feet knobs (monadnocks) extending from the Murrumbidgee to Moss Vale. Owing to an uplift of about 800 feet, this peneplain was cut into by the grade of the rivers being steepened, and all the foregoing level country (except the aforesaid monadnocks) was completely eroded. This cycle continued to a stage of late maturity; and at that period the country consisted of broad rolling valleys, whose chief direction was north and north-west. Then, some 20,000 years ago, as deduced from the Lake George infilling, an age of unrest set in. We know of the huge simple fold which constitutes the Blue mountains scarp (above Penrith). We know of the wonderful Nepean gorge (to the north-east of the territory) due also to this movement. The movement extends to Mittagong, and has no doubt influenced the Shoalhaven capture at Tallong (see Fig. 11). To the south the folding has changed into actual breaks in the strata—faults, in fact—and of these we have evidence at Lake George, along the Murrumbidgee, and further south also. Probably at this period huge areas of the coast subsided—it may be as a series of tilt-blocks like the one described in Fig. 9.

Thus the late maturity of the topography has been considerably

* See *Bulletin* 8, issued in 1911 by the Commonwealth Bureau of Meteorology, Melbourne.

modified, and, owing to the differential character of the movements, the result is that "young" and "mature" features are placed in juxtaposition in a way that makes the path of the investigator difficult, both metaphorically and literally. The edges of maximum uplift are notched by powerful streams, which are technically known as "antecedent," because their courses date from pre-uplift dates. Numerous "obsequent" streams of no great length have scoured gullies down the face of these scarps (*e.g.* Grove creek). "Rejuvenation" has affected the mature features of the area to a considerable extent, especially near the junction of the tributaries with the main river.

### D. *Meteorology.*

The relation between the rainfall and the topography is very well marked in the physiographic area of the upper Murrumbidgee basin. The

MEAN ANNUAL RAINFALL IN REGION AROUND THE FEDERAL TERRITORY.
From Map by the Commonwealth Meteorologist.

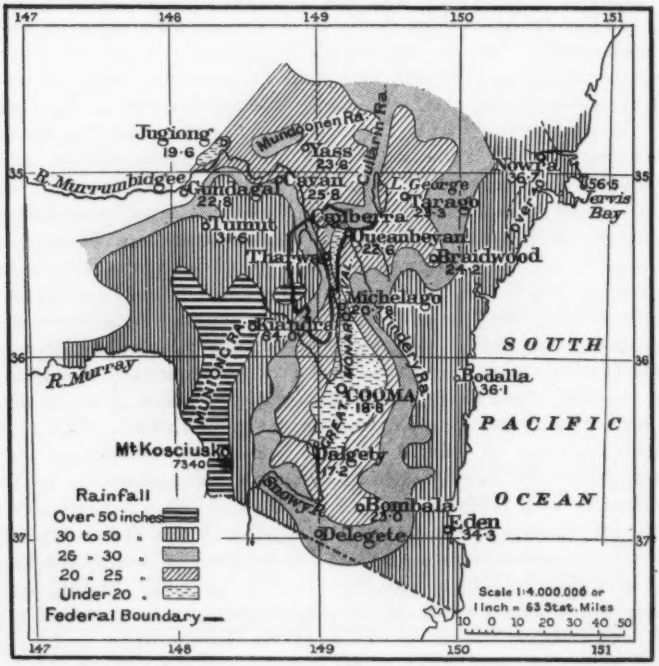



FIG. 13.

rainfall grade is steeper than in any other portion of New South Wales. Within a distance of 40 miles the rainfall has dropped from 64 inches at Kiandra to 19 inches at Cooma (see Fig. 13). But the most interesting

fact is the elongated arid area extending from Bombala northwards to Queanbeyan, with an annual rainfall of less than 22 inches. This appeared to me to be a result of topography, and led me to realize that there was really a large continuous valley extending for 300 miles, from Cowra southwards over the border and practically to Orbost, on Bass straits. The middle section of this valley I propose to call the *Great Monaro valley*.

Investigation in the upper Murrumbidgee valley practically confirmed this supposition, though it showed the presence of three bars across the Great Monaro valley, two being of recent date. One of these at Cooma has cut off the upper Murrumbidgee from the Snowy river. Another at Delegate has cut off the Snowy from the Bemm (?) river. The third is the Old Divide at Tharwa, which has been breached by the fault plane and eroded to a comparatively wide gap by the big river. In Fig. 13 the areas over 3000 feet are shown as well as they can be plotted with our rudimentary knowledge of the contours in the Alps. It is seen that this region is broken into three large portions, each with an annual rainfall of over 25 inches. The Mundoonen ranges of 2500 feet (along the north bank of the Yass river) also have a rainfall of about 25 inches. Then the parallel Murrumbidgee-Yass valley forms a drier belt with 21–22 inches. A very interesting isolated arid area is the enclosed basin of Lake George (22–23), separated by a belt of better rainfall (25–27 on the Cullarin fault scarp) from the next area. The lowest rainfall (18–19) occurs in the north of the Great Monaro valley (near Canberra) and in the south of the valley (near Dalgety). On the flanks of the valley the rainfall very rapidly increases to 50 inches on the west and 30 inches on the east.

Naturally enough, the lines in Fig. 13 can only be drawn approximately. Without doubt, when more data are collected, the agreement of rainfall and topography will be found to be more exact in some regions, and not so close as I have shown in others. Moreover, it must be noted that the direction of the prevalent winds is a factor which is independent of the topography, and may very well lead to a want of concordance between the contours and the rainfall.

*Meteorological Data.*—The average rainfall of the territory is 25·5 inches, or about that of Melbourne or London. The highest recorded average is 32·92 inches at Uriarra, and the lowest 18·74 inches at Duntroon. At Queanbeyan, which is only 8 miles from Canberra, records have been kept for forty-one years. Its elevation and position is much the same, so that the figures for Queanbeyan in the following table must represent those of Canberra very closely.

The mean annual temperature at Queanbeyan is 55° F., the summer mean being 68° F. and the winter 42° F. The prevailing winds during the winter months are from the west. The snow-clad Alps lie to the south-west of the territory, so that some of these winter winds are extremely keen. During the summer hot winds from the west and north-west alternate

| | Elevation. Feet. | Annual rainfall. | | | Temp. Fahr. | | | |
|---|---|---|---|---|---|---|---|---|
| | | Average. | Max. | Min. | Average hottest month. | Average coldest month. | Highest on record. | Lowest on record. |
| Queanbeyan | 2000 | 22·65 | 41·29 | 10·45 | 68·4 | 39·7 | 104 | 11·1 |
| Brisbane ... | 137 | 47·05 | 88·26 | 16·17 | 77·1 | 58 0 | 108·9 | 36·1 |
| Sydney ... | 146 | 48·00 | 82·81 | 21·48 | 71·6 | 52·3 | 108·5 | 35·9 |
| Melbourne | 115 | 25·60 | 36·61 | 15·61 | 67·5 | 48·5 | 111·2 | 27·0 |

with cool winds from the south, while frequent north-east winds from the ocean spring up towards evening.

## V. Work accomplished at the Capital.

(*Vide* folding map of the territory, p. 480.)

With the exception of the preliminary surveys, work commenced in October, 1909, when the state of New South Wales surrendered the Territory to the Commonwealth. My connection with the capital commenced next year.

In 1907 I made a physiographic survey of the Lake George and Upper Molonglo area, which is structurally a portion of the region occupied by the territory. At this time there was no thought that the capital would be built on the Molonglo and only some 10 miles from Lake George. In July, 1910, I paid my first visit to the actual site, for the purpose of prolonging my study of the physiography to the westward. A keen wind was blowing from the snow-clad Alps to the south, of such intensity that Professor David—who was one of the party—declared it was as searching as any he had recently experienced in the Antarctic! If environment makes for energy, our lawgivers should find the new Houses of Parliament conducive to earnest work, at any rate in winter.

The Federal city of this date consisted of three one-room huts, built of ruberoid fabric, and about a score of tents. The first settlement was in the timber belt just north of Mount Mugga, and was essentially for survey work. A contour survey of the immediate vicinity of the city area was first completed, largely with a view to obtaining a suitable design by a world-wide competition to be referred to later.

Roads throughout the territory were surveyed, and operations thereon commenced. The two main routes to Yass (north) and Queanbeyan (east) were soon improved, so that the traveller could tell from the decrease in the jolting of his conveyance when he entered the territory. Other roads are now in good order. One leads to the Stromlo Observatory (8 miles west) and thence to the Cotter weir just above the junction of the Cotter with the Murrumbidgee. Another goes south to Tharwa and connects with a route up Mount Tidbinbilla (5115 feet), whence a

grand panorama of the territory can be viewed by the visitor (see Fig. 6). The rugged granite gorges in the south-west at Gudgenby and Orroral have not yet been reached by aught but the roughest bush tracks. Here the settlers find it easier to reach Cooma (over the divide) than Queanbeyan; though the latter seems from the map to be their natural centre of supplies.

By far the most imposing settlement in the territory is the Royal Military College at Duntroon, which is situated on the slopes of Mount Ainslie, about 4 miles east of the city site. This has been in working order for two years, though it was not commenced until November, 1910. Duntroon House—the "homestead" on the former sheep "station"—has been remodelled to make it suitable for an officers' mess. Many large and permanent buildings have been erected for the Officers and Teaching Staff, while laboratories and workshops, stables, barracks, *et hoc genus omne*, make a sufficiently remarkable show in the midst of a typical Australian "sheep run." The cadets number about 150, and are drawn from New Zealand as well as from the six states.

On Mount Stromlo an observatory has been in operation since 1911; the chief instrument being a Grubb 9-inch refracting telescope presented by Mr. Oddie. The essential conditions for good-seeing prevail in the dry and clear atmosphere of Stromlo. 2519·3 hours of bright sunshine were registered in twelve months of observation during 1911–12. The prevalence of strong winds is an objection, but this would, however, probably apply at any other station 2660 feet above sea-level.

Reference has been made to the railways under construction and survey. Briefly it is proposed to run a complete line from Yass through Canberra to Jervis Bay. Of this the section from Canberra to the existing Cooma line is nearly completed. A geological survey of the actual city site was made in 1910 by Mr. Pittman. During 1912–13 a reconnaissance geological survey of the territory was made by Mr. Mahony and myself, with the results shown in another section. A topographic survey is proceeding, and is about half completed.

The important question of water-supply remains to be dealt with. The city will be built on the banks of the Molonglo river, but this river, although useful for watering stock and (when filtered) for local use, is not large enough to supply a city. Indeed, in midsummer it almost ceases to flow. Yet in a few hours it may change from this condition to a flooded river capable of washing the mail bags out of the coach; an event which actually signalized the end of the dry spell on February 28, 1913. A dam just below the city site will impound this river, forming an artificial lake (4 miles long and about 12 feet deep) which will greatly enhance the beauty of the city.

The city water-supply, however, is to be obtained from the Cotter river, a tributary of the Murrumbidgee river, which flows northward in the south-west portion of the territory. A site for a weir has been selected

about 1 mile above the junction at an elevation of 1560 feet. The weir is being constructed and is about 12 miles W.S.W. of the city; a lift of about 900 feet is required to raise the water to the top of Mount Stromlo, where the distributing reservoir is to be situated. The mean daily flow during 1910–12 was about 50 million gallons, and it is estimated that this is more than sufficient for all the requirements of a city of 200,000 inhabitants. The upper valley of the Cotter is so rugged and far from all settlement that only one or two people have ever traversed it, and the map simply indicates it by a broken line in a perfectly blank strip of territory! Rising in mountains over 6000 feet high, there is no doubt that its head is in a region receiving 60 inches of rainfall a year; while the character of the valley—a gorge 30 miles long without a single tributary—ensures freedom from pollution to a marked degree.

At this stage it will be interesting to inspect the capital on the date (March 12, 1913) when it received its official title of Canberra. Although in cannot be considered far advanced towards its goal yet, it has progressed considerably from the tents of 1910.

The centre of the official population has moved north across the river to the old homestead of Acton. Here a wooden bridge crosses the Molonglo, and on a low limestone spur to the north the administrative buildings have been placed. They are temporary, of course, built of wood and galvanized iron, as is universally the case in inland Australia. In front is the meteorological compound, the chief feature being a tank to test the evaporation. This is a very important factor in Australia; for it is not much use having even 12 inches of rainfall if the evaporation is 12 feet, as is quite usual in our more arid regions! Across the road is the old homestead of Acton, now the residence of the Director-General of Surveys. Magnificent poplars and willows, elms, and other English trees show that the climate is suitable for British-born residents.

The next few acres are devoted to a nursery for young trees, among which rows of hawthorn are noticeable. I have never seen finer bushes of this tree than those near Canberra, even in England. Eucalypts, Australian pines and wattles are, however, extensively represented in the nursery. The ruthless "ringbarking" of the past century has depleted the country. On the plains, the grass may grow the better, but on the rocky ridges this "improvement" (though stipulated by the conditions of lease) has chiefly resulted in much of the soil being washed off the slopes without any compensating advantage whatever. Another block of wooden buildings form the quarters of the Works Department Officers. To the west, a short distance away under some large eucalypts, is the "canvas town" of the hundred workmen and their families, whose headquarters are here.

A more imposing building, with a large mess-room and comfortable reading-rooms, is the Bachelors' Quarters, for junior draughtsmen and clerks. Behind this again, now among the tree belt, lie the houses of the

married officers. A small wooden house formed the Administrator's residence, while large military tents furnished the sleeping-quarters of his household ; but a permanent residence has just been completed on the highest portion of the ridge for his occupation. Down on the flats, to be submerged by the Molonglo lake, are the cricket field and tennis courts for the staff.

Some 2 miles to the east is Canberra Church and the rectory. As far again is the next community—that of the military establishment of Duntroon. All stores are brought in daily from Queanbeyan—a small town 8 miles to the east. In the whole territory there is only one inn, a somewhat primitive establishment at Hall, close to the northern boundary, so that casual visitors are extremely rare at Canberra.

On March 12, 1913, the capital was officially named Canberra by Lady Denman ; the Ministry, in deference to the wishes of the large majority of Australians, having decided to give the name of the parish to the future capital. It is to be noted that the accent is on the first syllable as in most native names, so that the pronunciation closely resembles that of the word "camera."

At intervals of 5 miles or so are the homesteads of the score of sheep stations which are distributed over the territory. Steel windmills, water-holes, and shearing sheds are always in evidence. The district has long been settled, being indeed first occupied about the time of Waterloo, and these old houses are nearly all surrounded by fine trees and often covered with creepers.

At the ford over the Murrumbidgee near the Cotter weir is another "canvas town," with about one hundred men living there. Further to the south, still on the "Big river," is Tharwa, with the granite quarries mentioned in the geological notes. Hall, Tharwa, Jininderra, and perhaps Uriarra in the north-west are the only villages, if such they can be called, within the territory.

## VI. Plans for the Future.

In writing this heading, one involuntarily recalls the tireless energy of the Administrator, Colonel Miller—whose cheery optimism has successfully engineered the city scheme through the most critical portion of its career.

Apart from the city itself, there is an area of some 900 square miles of the territory to be economically developed, which is watered by the second river in Australia. Much of this is undoubtedly suited chiefly to stock, but the large alluvial flats near Canberra itself can certainly be put to more profitable use than sheep grazing—especially with a city arising in their midst to absorb their agricultural produce. Horse-breeding, irrigation, afforestation, are but three of the factors which will vastly enhance the value of the territory in times to come.

It is, however, the actual building of the city which is occupying the

immediate attention of the authorities. Competitive designs were received from all parts of the world, that of W. B. Griffin of Chicago receiving the first premium. Subsequently the Commonwealth Departmental Board

DEPARTMENTAL

PLAN OF THE NEW COMMONWEALTH CAPITAL

CANBERRA

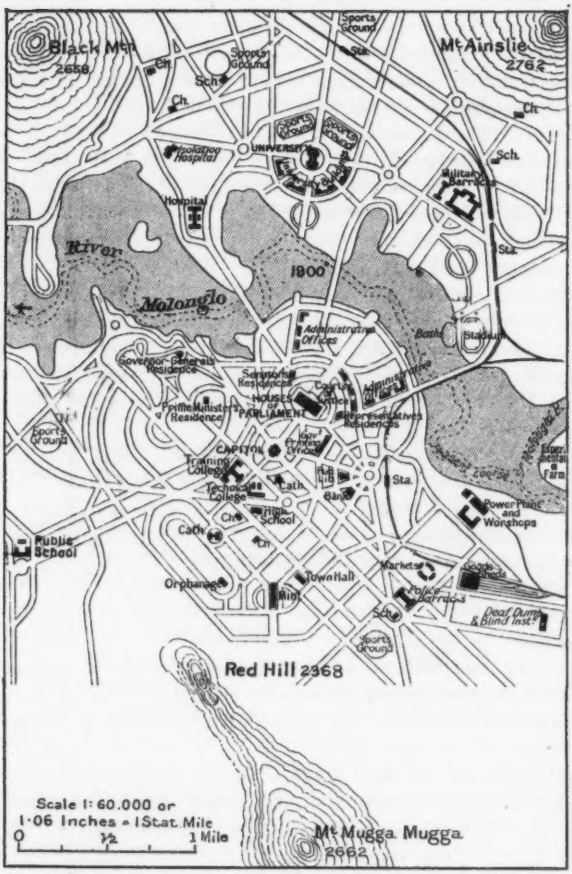



FIG. 14.

produced a plan which more closely considered the actual contours of the city site. These will form the basis of the actual scheme and a few words on the type of city arrived at will be of general interest.

The city is to be built on a plain of some 9 square miles, bounded by the abrupt, somewhat conical, ends of three low ranges. These are Black Mountain and Ainslie, on the north-west and north-east respectively, and Mugga on the south. The city will be primarily the official and social centre of Australia. Consequently, the dominating feature of the city will be the Houses of Parliament.

The site of the Houses of Parliament is south of the river Molonglo, on the foothills of Mount Mugga. The administrative buildings will be placed between this spot and the Molonglo. The railway stations will lie to the east of the city, and the line to Yass will curve below the slope of Mount Ainslie to the north. In the east also will ultimately arise the manufacturing centres; for here, as in most cities, the *west* end, with its fresh winds, is always the best residential quarter.

In plan it is seen that the rectangular system of streets, beloved of American cities—and also unfortunately used in Melbourne and Adelaide—is wisely completely abandoned (see Fig. 14). The cobweb is taken as a pattern, and three of these radiating and concentric units dominate the city plan.

When it is realized that about 90 per cent. of a city's travelling population need to visit the centre of the city every day, the waste of energy in a town such as Melbourne (devoid of radiating streets except in two directions) is enormous.

In the centre of the city will be Lake Molonglo, which will be kept in a pleasing state of purity in a dry summer by the regulating weir higher up its main tributary, the Queanbeyan river. Beautiful panoramas of the city will be viewed from the hills rising sharply 800 feet above the plain on three sides of the site.

We may picture this city of noble granite buildings rising amid boulevards where the sombre beauty of the native trees is relieved by the graceful elms, oaks, and poplars of England. In the centre the lake will be fringed by magnificent willows—as the river is to-day. Some 20 miles to the west the blue crest of Tidbinbilla rises 5000 feet to still bluer skies. In winter it is often covered with a mantle of snow, and in the same range farther to the south stands out the flat top of Long Bimberi—over 6000 feet high and practically the second mountain in Australia.

## Conclusion.

I feel that I cannot more fittingly close this account of the foundation of the capital than by quoting from a speech which I had the pleasure of hearing at Canberra. The ethical aspect of the question is here treated in a masterly fashion. The Governor-General spoke as follows:—

"There are people who say, 'Why have a federal capital at all? Why not let the seat of Government be at Melbourne or Sydney?' The best answer seems to me to lie in the fact that in the judgment of those who framed the Constitution Act of 1900, federation would have been impossible

had not a compromise been arrived at in this matter, and would have probably been postponed for at least a generation. Now, the essence of British self-government is compromise, and the acceptance of the accomplished fact.

"Then people say that this federal capital is too costly an undertaking. It is certainly not nearly so costly as it would have been to excise even a few acres for federal territory out of one of the great cities of Australia. But when you consider the great advantages that have accrued from federation—for example, the better relations between States, as evidenced by the abolition of inter-state duties, the building up of an army and navy, the adoption of universal training, and above all the creation of a national Australian spirit—it seems scarcely generous to cavil at the initial expense which must sooner or later be incurred by the founding of this federal city. And I believe that ministers contend, not without force, that owing to the improvement in land values in the federal territory, this is not likely eventually to prove such a costly undertaking. Whether that be so or not, it can scarcely be to the advantage of this country that so large a proportion of people should be massed into great centres of population like Sydney and Melbourne.

"The federal capital cannot hope to vie in wealth and population with Sydney or Melbourne, but that seems to me no reason for discouragement and to afford no ground for regret. The capital of the United States of America is but the sixteenth city in point of population in the union. Yet Washington stands in need of no apology.

"To those who criticize the choice of locality, I would recall this phrase, 'There are no points of the compass on the chart of true patriotism.' The time for doubt, misgiving, and criticism is past; it seems to me the duty of patriotic Australians to do all that lies in their power to make this capital worthy of the Commonwealth."

The data in this paper are derived largely from Government publications, associated in part with the names of Colonel Miller (Administrator), Mr. Scrivener (Director of Lands and Surveys), Mr. Hunt (Commonwealth Meteorologist), and Mr. Knibbs (Commonwealth Statistician). I desire to thank these gentlemen for their assistance, and also Captain Collins and other officers of the Commonwealth Offices in London.

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The PRESIDENT (before the paper): Our lecturer this evening, Mr. Griffith Taylor, received his education firstly at Sheffield and afterwards in the Sydney University, Australia, where he graduated in Science and Engineering in 1903–4, and for the three following years was demonstrator and lecturer in geology and geography. From 1907–10 he was at Cambridge University as a science research scholar, and he graduated there in 1909. He became physiographer to the Commonwealth of Australia weather service in 1910, and it was in this capacity that he surveyed the territory set apart as the Federal district of the Australian Commonwealth upon which he is going to lecture to us to-night. Mr. Griffith Taylor has other claims to our admiration and regard. In 1911 and 1912 he

acted as leader of the Western Geological party in Captain Scott's Antarctic expedition, and he is going to give the Society some results of that work at a Research meeting on Thursday afternoon next.

Captain MUIRHEAD COLLINS (after the paper): I am sure we have all heard to-night with great interest the lecture by Mr. Griffith Taylor, who is a distinguished graduate of our University in Australia, and I am sure he has shown you perfectly clearly what a city of infinite possibilities this future capital of Australia is. I am pleased to think that we have adhered to the name of Canberra, especially as I was one of those (I suppose there are others) who suggested we should do so, because it is a native name itself, it is a well-sounding name, and it is distinctive. The choice of capital cities of most countries, I think, has been the result of a process, we might say of evolution, of natural selection due generally, I suppose, to advantages of communication by sea or by land, and sometimes to strategic or defence conditions. We might instance, for example, Rome or Paris, or London, but then there are capital cities that are the result of either autocratic methods or artificial selection. Perhaps we need not go back as far in history as Carthage, but we might come to Madrid, where a King of Spain said, "Here shall be a capital city," although it was in a most unfortunate site, perhaps, because it is swept by icy winds in winter. We have again the autocratic method of setting a capital, the famous Czar, in the case of St. Petersburg. But then we come to Washington, and that is a city that in its circumstances more closely resembles perhaps the circumstances that surround the selection of our Federal Capital, because you have a Federal area, and in Australia you have the same, a large federal area of 900 or 1000 square miles, that will be entirely administered and under the jurisdiction of a federal authority. In Washington we have the instance of a city that was planned by a Frenchman, and this Frenchman in laying out Washington, as those who have been there know, provided amply for squares and avenues, luckily for Washington, but he did not do so at the time from any idea of the amenities of life, to which they have so largely contributed, but he was at the time dominated by the Napoleonic idea of the advantage sometimes of clearing the streets by artillery, and he provided these magnificent squares and these lovely avenues because the square is suited to park artillery, and the avenues for its most effective use. However, these parks and these squares have given to the people spaces for recreation and provided the children of Washington with splendid playgrounds. Fifty per cent. of the area of Washington is in parks and squares and avenues. Well, although the Federal capital of Australia perhaps as regards the selection of a site is due to political considerations, yet I think Mr. Taylor has shown us to-night very clearly that in its situation, in its climatic conditions and its rainfall and temperature, we may fairly well rest satisfied. We have perhaps curiously gone to the United States, or borrowed from the United States, the expert who is to lay out our city, and I have not the slightest doubt that though he will not have the fixed idea of the Frenchman, his predecessor in the case of Washington, he will be perfectly aware that in these days people want space and air to breathe, and that we shall have in the future years a capital city in Australia of which those that come after us will be proud, and we may all express the hope that it will be a thing of beauty and a joy for ever.

The Hon. A. KIRKPATRICK: I am very pleased indeed to have had the good fortune to have been here to-night and to have heard the very interesting address by our lecturer. As to whether the capital is to be a success or not, all I can say is this, that it should be. I think anything should be a success in the way of city building where an expert has the opportunity of laying his plan before the

city is started to be built. Unlike older cities such as London, such advantages as that, of course, were absent, but seeing that the Commonwealth Government called for applications from all over the world for designs, and having chosen what is considered by a Committee of experts to be the most suitable of them all, and that the carrying out of those designs are in the hands of such a gentleman as the American expert, it ought to be a success. I agreed with nearly everything our lecturer said to-night, except where he didn't seem altogether pleased with the design of the city of Adelaide—quite an exception of course to the general rule. A member of the British Parliament who recently visited Australia, I was reading only the other day (I would not say what the city of Adelaide is like myself, because I might be prejudiced), at a farewell gathering, told the people of Adelaide that he had travelled considerably over the world, and Adelaide was certainly the finest and most beautiful city he had ever seen. That is not surprising, because that city was built to a plan. Colonel Light some seventy-seven years ago drew that plan before a brick was laid in the city, and it has the advantages of no crooked streets, they are all straight; you can see from one end of the street to the other, and it is full of squares, and right round it on four sides there are big open spaces. As for health, it is the healthiest country in the world excepting New Zealand.

Sir T. B. ROBINSON: I will begin by confirming what Mr. Kirkpatrick said about Adelaide. I really think it is one of the most charming and delightful cities in the southern hemisphere—it is quite like Brisbane in some respects. Among the pleasures which I enjoy when I go to Brisbane is a visit to a dear old friend of mine, a lady who is now approaching eighty years (she was one of quite the early arrivals in Brisbane), and she told me that when she landed there were three wooden humpies on the bank of the creek, and that was all there were when she arrived. Brisbane to-day has a fine big street which is called Queen Street, and electrical tramcars are running up and down that street. The buildings on either side of it would not disgrace Piccadilly. One of them is a great big drapery establishment, not quite so big as Selfridges, but it has a roof garden; but that and many others have been built during the lifetime and less than the lifetime of my dear old friend. Now imagine if you can the difficulties which the people had to contend with who laid out those cities. They are the people, who, if you are walking about in the streets, meet you at every turn. Many of them went away from here never dreaming it would fall to their lot to design cities or lay out plans of cities, and I think we are greatly indebted to the lecturer, to whom we have listened with a great deal of pleasure, for directing the attention of people in the old country to matters of this kind. On the last picture we saw upon the screen there was a portrait of the Rt. Hon. Andrew Fisher, until recently the Prime Minister of the Commonwealth. He left this country a few years ago through the influence of a friend of mine, to go out there as a coal-miner. Now I venture to say that his parents in giving him an education which has stood him in good stead, little thought it would fall to his lot to have anything to do with designing the city which in the future will be the capital of the great Commonwealth of Australia. I hope you may be so interested that you may think it well to talk to your children about matters of such a nature, because you never know to what high office they may be called in the future. Town planning is now engaging some of the attention which it deserves in this old country. It is true that in most of the Australian cities the streets run at right angles, and, as the lecturer said, now that those cities are becoming so large, it is difficult to get from one point to another without having to traverse rather more ground than would seem to have been necessary if they had stuck

to the old London plan of building on the cobweb principle, because I think London approaches nearer to the cobweb principle than some of the American cities. How carefully the authorities should choose to have all the drapers' shops on the shaded sides of the street! And then, having regard to what one sees with so much pleasure at Hamburg, it is gratifying to know that Canberra will have a fine lake running through the centre of the city. There are a great many problems that confront those of us who have something to do with town architecture in Australia. If you get a flat plain for your site, such as we have seen from some of the photographs shown upon the screen to-night, the question arises as to the means of quick locomotion. Are you to keep your railways on the surface? If so the railway track is not a very interesting or very picturesque feature in a city, and it may involve level crossings or awkward bridges. If you have rivers to cross how are you going to deal with your bridges there? and if your system of locomotion is to be tramways, or worse still, motor omnibuses, suitable provision and ample road surface must enter into the consideration in planning your streets. Now we have been wise in most of our Australian townships in keeping our streets wide to begin with. Having seen the disadvantages of the narrow streets in the old country, we have, perhaps, gone to the other extreme in making some of our streets in what are to-day second-rate townships, two chains wide, and when a municipality takes over a street 120 feet wide, and is expected by the users to keep it in something like good order, you may imagine that the cost of keeping up street surfaces of 120 feet in width is rather more than the rates of a small township is capable of doing without excessive taxation, but happily means have been found for reducing the area temporarily, and in the northern parts of Queensland, and even in some of the streets in Melbourne, in the centre of the roadway, the Municipality have cultivated trees and rock and garden work, and have confined the road surface to a narrow or comparatively narrow passage on each side of these decorative parts of the street. That has made the roads very much more interesting and picturesque and has kept down the rates. There are so many possibilities that enter into one's mind when one considers how, in the case of Canberra, all these problems are ahead of us. I am, however, fully assured that Australia will produce a capital city worthy of herself, and I sincerely hope many of us may live to see that city.

The PRESIDENT: We have all admired the ingenuity with which our speakers have combined an expression of their general approval of the new federal capital in Australia with a fervent loyalty to the capital cities of the States they represent. I am sure that their general remarks will be read with as much pleasure at the headquarters of the Federal Government in Australia as their particular observations about the capital cities of their own States will be in those places, and that the latter observations will ensure them a long continuance in the enjoyment of those offices which they both adorn. We have had, as you will agree, a very interesting paper on an interesting subject. In England we have followed, not without interest, but I dare say with a fair share of ignorance and some mystification, the long struggle over the question of this Australian capital: the difficulty about the site, and about the absolutely impossible names, including the apprehension mentioned by Captain Muirhead Collins that the name of a Labour Minister might be attached to this important spot. I think we may congratulate the Government of the Commonwealth upon two things: firstly that there was such a number of good sites, that according to the lecturer it was only by a casting vote that they ultimately decided in favour of Canberra; secondly, the decision having been made, upon their having obtained a site which seems to meet with such very general approval. The reasons were made patent in the lecture

to which we have listened, and I must congratulate Mr. Griffith Taylor on the very concise, scientific, and systematic way in which he dealt with every aspect of the case, illustrated by photographs and diagrams which left nothing unexplained. There is one point, however, that I should like to ask about, and that is the question of vegetation—a very important one for the amenities at any rate of a future capital. He showed us in some of his pictures, groups of the Australian eucalyptus, and in a few cases, round the sheep stations, specimens of English trees; but he gave us no particular idea of the vegetation with which the new capital—in its avenues, its groves of timber, and the drives in its parks—is going to be adorned. He also said nothing about the type of architecture to be adopted. I hope it may be as little like the specimens of buildings which he showed upon the screen as possible, and if we are to have a new city, that it may contain official buildings, streets, and even private houses worthy of the purpose. And, thirdly, he said nothing, perhaps wisely, either as to the length of time over which the building of the capital will be spread, or as to the cost. No doubt those are questions which did not concern him as a geographer, but they are very pertinent questions, and we should like to hear from him what is the idea as to the number of years that will elapse before the capital is built, and to what extent it will be necessary to dip into the pocket of the people. I have nothing more to add except to make myself the vehicle of your thanks and congratulations to the reader of a most excellent paper.

Mr. TAYLOR: With regard to the vegetation, the country, as I said, has been occupied for many years by sheep stations, and one of the provisions that obtains in Australia is that when you take up a Government plot you must "improve" it, so that the trees have all been ring-barked and died. There is no timber except on the ridges, but, as I think I showed, there is no earthly reason why there should not be many trees there in the future, and we have nurseries instituted. We are doing very well indeed, considering we are only about a year old! With regard to the architecture and to the time the capital will take to build, I think, my Lord, you expressed it well when you said that nothing appears to be known.

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## THE PLAN FOR A NEW ANGLO-SWEDISH ANTARCTIC EXPEDITION.

By Admiral L. PALANDER and Prof. OTTO NORDENSKJÖLD.

ALTHOUGH the Polar regions to the south of South America have been visited several times by expeditions, still they belong in many respects to the least known parts of the globe. The coast which has been carefully explored by Dr. Charcot, is somewhat monotonous in its nature. The Atlantic coast and the South Shetlands, which lie off it, are still, in spite of their accessibility, comparatively unknown. The coast opposite South America from a scientific point of view, is known almost exclusively through the Swedish Antarctic Expedition of 1901–1903. But it is this last-named tract that is of particular interest, its nature, in comparison with the other parts of the Antarctic continent with which we have any acquaintance, being of such a varied and abundant character. There is a considerable

extent of land that is free from ice, while the ice itself offers remarkable variety in structure and formation. The climate is a very interesting transition climate, at times mild even in winter, under the influence of northerly winds from the sea, but mostly very cold, owing to the violent south-west storms that prevail. Of particular interest were the geological discoveries made by the expedition. While all the other South Polar regions known to us are very poor in fossil remains, here these were discovered in great abundance in strata belonging to four geological systems: the Jurassic, Cretaceous, Tertiary, and Pleistocene. About 300 species taken from these strata, most of them new to science, have been described. Special interest attaches to the plant remains from the Jurassic and Tertiary Periods, the latter being of South American character, as well as to a number of vertebrate remains, also from the Tertiary Period. These discoveries now make it possible to follow the development of life in the South Polar Circle during recent geological periods, and they have proved that in the matter of structure there is a strong analogy between South America and this part of the Antarctic continent.

But also living nature in these parts, although only in the sea, revealed a wealth that was quite unexpected. It was shown that in the cold water on the broad continental shelf off the east coast, as well as in the deeper cavities in it that the expedition discovered, there flourishes a rare and varied fauna, to a greater extent than seems to be the case elsewhere off the Antarctic coasts. The algal vegetation, too, is very luxurious in places. Unfortunately, only a small part of the large collection that was made by the Expedition was destined to serve the cause of science. The greater part by far found the depths once more when the vessel of the expedition, the *Antarctic*, was crushed by the ice in February, 1903, and sank in the Erebus and Terror gulf.*

In another and unexpected way, however, the biological observations of the Expedition were to be of very great importance. The abundant animal life, which has just been referred to, supports great shoals of whales along this seaboard, and this induced the captain of the *Antarctic*, Mr. C. A. Larsen, to found a whaling-station soon after his return home, not precisely here but on South Georgia. As the undertaking proved a success, other companies, tempted by the descriptions furnished by the expedition, moved their stations to the South Shetlands. Now a flotilla of about 40 vessels meets here every year, and the value of the yield during the years that have elapsed amounts only in that district to about two million pounds sterling. By this means an Antarctic territory has for the first time become of considerable practical value, and the whole of this domain, as well as the stretches of east coast which the Swedish Expedition was the first to explore, have now become, as is well known, attached to the Falkland Islands Colony.

* For the results of the expedition, cf. the article in the *Geogr. Journ.*, vol. 38, p. 278.

It is only natural that after these discoveries much interest was aroused in Sweden for another expedition, which should be able to continue what its predecessor had begun in the way of examining a tract that held out so much promise, while at the same time it should provide science and the museums with fresh material from the treasures discovered. On the initiative of Professors J. G. Anderson and Otto Nordenskjöld a committee was appointed in 1913, with Admiral L. Palander as chairman, which committee has now drawn up plans for a new South Polar expedition to the same locality. It is the details of this plan, as laid before the Swedish Anthropological and Geographical Society, that we will set forth in the following.

In order to make a great effort, once and for all, thoroughly to explore this vast and varied territory, as yet but little known, the best plan seems to be for the proposed Expedition to be at work for a sequence of years, say five. A fixed station would then be established sufficiently far north to be able to count on coming into contact annually with the chief station of the whaling companies at Deception island, but at the same time so placed that exploring expeditions could be sent to the east coast with the least possible delay and difficulty. In order conveniently to move about among the islands, and to explore the adjoining waters, the Expedition must command a fairly large vessel, preferably one of the Norwegian bottlenose whaler type with oil motors. If possible, therefore, the station should be established in a harbour that can accommodate the vessel. From the experience gained during the last Expedition it seems improbable that any such harbour exists along the mainland, but probable that one can be found in the straits between Joinville island and Dundee island. Here a biological laboratory is to be placed and all the necessary apparatus set up for investigating climate, terrestrial magnetism, tides and so forth, and all collections are to be brought together here that have been made in the district. During the summer the biologists of the Expedition could be at work uninterruptedly, either on the vessel or in small boats, investigating the life in the ocean and collecting specimens from it. As we know how abundant that life is, and how great are the variations in the temperature of the water, in the sea-bottom, etc., it is safe to predict that these collections, if they can be brought back intact to Europe, will be far more comprehensive than any as yet brought home by a polar expedition. The intention is also to study closely the biology of the whales, and this would best be done by collaboration with one of the whaling companies.

The whole region will be mapped down, in part from the vessel, in part by means of sledge expeditions, which could very well be carried out in the summer on the land-ice. This would also afford good opportunities of making geological collections. It is by no means probable that the previous Expedition found all that is worth collecting in this respect; very possibly there may be other geological systems in the nunataks of the

folded mountain chain, and certainly valuable collections of new material can be made, while in the horizontal strata of the east islands there is practically an unlimited field, with great promise to the scientist.

When the whole area about the main station has been studied, it might be advisable, later on, to equip a branch expedition which would spend some considerable time, perhaps overwintering, further south, either at Seal island or more southerly still, in order to examine these parts of the coast. But once such an expedition has been equipped, it should be in a position, if occasion offers, to push afield and add considerably to the details of a South Polar Chart. The great question that still remains to be solved in the South Polar regions, is the connection between this West Antarctic territory, Graham Land and its environs, on the one hand, and the True Antarctic continent, which seems to be situated for the most part in the eastern hemisphere, on the other. This was the question that Lieutenant Filchner's German Expedition set itself to solve, and which is also the object of several other large expeditions now preparing, with their base at the south of the Weddell sea. And it will be one of the objects of the present Expedition too. As soon as a summer with very favourable ice-conditions offers, a large depôt will be moved as far south as possible, and, with this as base, a sledge party will attempt to find in what direction the coast of Graham Land continues beyond what is already known.

The vessel is to be equipped for oceanographic investigation, both about the station and further afield. Among the most important of the investigations at the station will be a study of the ice. We now know that it is the ice that determines the unique character of the Antarctic climate, and the last Swedish expedition commenced some interesting investigations in this province. In this respect the station, being established for several years, will give unprecedented opportunities, with which no North Polar station can compete, as it is precisely the study of the region of ice-accumulation that is so important. The results obtained should also be significant, for our knowledge of the Glacial period in our own hemisphere. Nor can it be doubted that in many other respects as well, this first attempt at a detailed study of Antarctic nature will be valuable to other provinces of science.

The staff at the station is to consist of about twelve persons, half of it being composed of the captain and crew of the vessel, who will of course also co-operate in the work on land, the other half of scientists, presumably a geologist, two biologists, a cartographer, a meteorologist and geophysicist, and a doctor. But this staff is not to be permanent all the time; those who wish it can arrange to return home by one of the whalers, and their places will be filled by others. The advantage of this scheme is that various branches of science can be represented at different times, and later on, when the general work is well on the way, there will be nothing against specialists coming out to put in some work during the summer months.

The Expedition shall have at its disposal a good, roomy building, and be generally as well equipped as its means will allow. Self-registering meteorological apparatus for the comparative study of the climates at different levels and localities will be set up in various places, and the outfit for biological collections will be of the best. A number of Greenland sledge-dogs will be taken, and, if possible, the plant for wireless telegraphy.

The plan proposed is that the Expedition shall leave Europe in August, 1915, and the part of the outfit that cannot be conveyed by the vessel will be taken by one of the Norwegian whaling companies, and left at Deception island to be fetched. The whalers will also from time to time in the following summers convey the necessary food and other stores that will be wanted. The first summer will be devoted to setting up the station; but if the ice-conditions permit, a reconnoitring trip will be made southward on the vessel to visit the depôts that were left by the last expedition on Snow Hill island, and to prepare for future sledge-expeditions. For the rest, the winters will be principally utilized to study the environs of the station, whereas spring and autumn are suited to sledge expeditions; during the summer the staff will be busily employed especially on scientific work upon the vessel. The Expedition is timed to return in February, 1920.

The expenses of purchasing a vessel and the initial erection of the station have been estimated by the committee at about £4000, the greater part of which has already been promised by two Swedish patrons. The annual expenses of maintenance, provided the co-operation of the whaling companies in transporting plant, and in keeping the station in touch with the outer world, is realized, have been estimated at about £3000. Half this amount the committee hope to obtain by a grant from the Swedish Parliament. In procuring the other half, the enterprise has met with the heartiest support in England. The trustees of the British Museum have promised an annual grant of £500 for five years, the Royal Society has granted £500 for the first year, and to judge from news lately received by the Committee, England's share in the undertaking gives promise of equalling Sweden's. There is every prospect, therefore, of the expedition starting at the appointed time.

It is intended to divide all collections made between English and Swedish museums, and two places on the staff will be reserved for English scientists, thus making it an Anglo-Swedish Expedition. The collaboration thus entailed will certainly be of the greatest benefit to the Expedition and its aims, and we hope that this undertaking, beside using the opportunities of penetrating to areas still unknown, will inaugurate a new phase in the history of systematic and detailed South Polar exploration.

## MAP OF THE BALKAN STATES IN ACCORDANCE WITH RECENT TREATIES.*

THE map published herewith shows the frontiers of the Balkan States as they appear in the various treaties and agreements concluded after the recent wars and the decision of the Powers to create the new State of Albania.

*Turco-Bulgarian Frontier.*—The frontier between Bulgaria and Turkey is set out in Art. 1 of the Treaty of Constantinople, the trace being referred to the Austrian Staff Map scale $\frac{1}{200000}$, and reproduced on the annexed map from it. The exact limits of the area west of Adrianople are defined with considerable care.

*Serbo-Bulgarian Frontier.*—The frontier between Servia and Bulgaria is defined by Art. III. of the Treaty of Bucharest, with detail in Protocol 9, Annex D of the same. It can be clearly traced on the Austrian Staff Map $\frac{1}{200000}$, and the line has been reproduced on the annexed map.

*Greco-Bulgarian Frontier.*—The frontier between Greece and Bulgaria is defined in Art. V. of the Treaty of Bucharest, with detail in Protocol 9, Annex B, of the same. This is also referred to the Austrian Staff Map, and the trace has been reproduced.

*Rumano-Bulgarian Frontier.*—The frontier between Rumania and Bulgaria is defined in considerable detail in the Treaty of Bucharest, and is referred to the Rumanian Staff Maps, scales $\frac{1}{100000}$ and $\frac{1}{200000}$. The other Bulgarian frontiers have been traced through mountainous country with sharply accidented features, such as watersheds and rivers to define them, but this line between Rumania and Bulgaria, crossing as it does gently undulating country with few prominent natural features, seems to have presented greater difficulties of definition than the others. In the first instance, to avoid difficulties, a list of villages adjoining the frontier is given in the text of the Treaty, stating in separate columns which remain in Bulgaria and which are to be ceded to Rumania. Most of these have been shown on the annexed map.

The Rumanian Government kindly forwarded to the Society a detailed map of the frontier reproduced from the Rumanian Staff Map $\frac{1}{100000}$. On this the frontier is shown by a red line, while in addition the framework of a triangulation with several points on either side of the frontier is shown in blue. The length of each side of the triangles is given in metres along them, and in the text of the treaty this triangulation is referred to as an additional means of identifying the frontier. Thus, the starting point of the frontier on the Danube is apparently a point in the stream between two islands, but is further defined by the triangulation as 15,000 metres along the side of a triangle commencing at a point near Turtukai.

This does not seem very satisfactory, and the description in the detailed

* Map, p. 604.

trace of the frontier avoids further definition by commencing with an assumption that the frontier has already left the Danube.

The termination of the frontier on the Black sea is still less clearly defined, as the articles of the Treaty do not mention it, and the detailed description ends rather hurriedly by saying the frontier finally reaches the Black sea, traversing the col situated south of crest 252. This point, however, is determined by the length of the sides of two triangles in the triangulation.

The text in French of the detailed description is somewhat involved at certain points, and from the point of view of geographical clearness, this frontier seems less satisfactorily drawn up than the others.

*Greco-Servian Frontier.*—This short frontier in Macedonia has been drawn up between the two Governments concerned, but is not defined in the Treaty of Bucharest, and no protocol defining it has been published. The Servian General Staff in Belgrade supplied the Society with a map showing the line as drawn on the annexed map, which appears to be settled now as the permanent boundary.

*Serbo-Montenegrin Frontier.*—This frontier between Servia and Montenegro cuts through the old Sanjak of Novibazar, and is not defined in the Treaty of Bucharest, but in a separate protocol drawn up between the respective Governments. The line was also drawn on a map furnished to the Society by the General Staff in Belgrade.

*Frontiers of the New State of Albania.*—The frontiers of the new State of Albania were defined during the proceedings of the Ambassadors' Conference in London during the summer of 1913, but no protocol was published giving the result of these deliberations, and the actual line was left to be defined on the spot by international commissions of officers. There are still some minor points to be decided, especially on the north-east frontier in the valley of the Black Drin, but the map shows the general frontier decided on, and the detailed delimitation will not be completed for some months to come. The Greco-Albanian frontier in the Corfu channel has been shown terminating at Pagania, and some slight modifications have been made on the Ergherikastro road in accordance with the Greek note of the 22nd February, 1914. The Southern Albanian frontier is traced from the map of the International Commission on that section of the frontier.

The status of the peninsula of Mount Athos, inhabited by some 10,000 monks grouped in monasteries of various nationalities, remains unsettled by the Powers. An International Ecclesiastical Republic has been suggested, but meanwhile Greek troops remain in occupation. The frontier at the head of the peninsula has not been defined.

According to the Treaty of London, the Servian Government has the right of access to the Adriatic by constructing a railway through Albania. The route suggested leaves the existing main line between Belgrade and Sofia at Nish. Ascending the valley of the Toplitza, it will

pass Prokuplie and Kurshumlie and cross the old Turco-Servian frontier at Mrdare. It then descends the Lab valley to Prishtina, where it crosses the existing broad-gauge Uskub-Mitrovitza line, traverses the low watershed westward of this and enters the valley of the White Drin, thus reaching Prisrend. Then entering Albanian territory, it will follow the valley of the Black Drin through Liuma, again entering Servian territory near Dibra. Following the river valley to Struga, it then turns westwards into Albania again over the Mokra Gora, enters the valley of the Shkumbi which it descends to Elbassan, and reaches Durazzo on the Adriatic through Pekinj. There will be a connection at Dibra with Uskub, and at Struga with Monastir and Salonica.

## TREATY OF CONSTANTINOPLE.

### 30th September (13th October), 1913.

#### Frontier between Bulgaria and Turkey.

Reference: Austrian Staff Map, $\frac{1}{300000}$.

Art. I.—The frontier between the two countries starts from the mouth of the river Rezvaya to the south of the monastery of Sveti Ivan (S. Ivan) on the coast of the Black sea, and it follows the course of this river to the junction of the streams Pirogu and Deliva, to the west of Kamila Keui.

Between the mouth and the point of junction above-mentioned, the river Rezvaya trends first in a south-westerly direction, and, leaving to Turkey Placa, forms a bend, turning first north-west, and then south-west; the villages Madzura and Pirgoplo remaining in Ottoman territory.

The river Rezvaya, above Pirgoplo, trending south for an approximate distance of 5½ kilometres, forms a bend to the west, and then to the north. In this section, Likudi and Lladara remain in Bulgarian territory, and Ciknigori, Mavrodio and Lafva are restored to Turkey. The frontier, still following the Rezvaya river, leaves Torfu-Chiftlik to Bulgaria, turns south-east, and leaving Radoslavci in Ottoman territory, trends obliquely to the west at about 800 metres to the south of this village; it leaves Kamila Keui in Ottoman territory and reaches at a distance of about 400 metres to the west of this village, the junction of the streams Pirogu and Deliva. From this junction the frontier follows the course of the Deliva, along the river in a general north-westerly direction, leaves to Turkey the villages Paspala, Kandiljik, and Deli, and terminates on the east of Soghuk Su, this last-named village remaining to Turkey, while the village of Seveligu reverts to Bulgaria.

The frontier passing between Soghuk Su and Seveligu continues in a north-westerly direction, following the crest line along the summits 687, 619, and 563; beyond the summit 563 it leaves Caglaik (Chairlik) in Ottoman territory, and bending round this village at 3 kilometres to the east of it, and then trending north, reaches the Golema stream.

The frontier follows the Golema for about 2 kilometres, and reaches the confluence of this stream with another, which comes from the south of Karabanlar. From this junction the frontier passes along the crest to the north of the stream from Turk-Alatli, and reaches the former frontier of Turkey and Bulgaria.

The junction of the new frontier with the old is a point 4 kilometres east of Turk Alatli, where the former Turco-Bulgarian frontier makes a bend to the north in the direction of Ajkiri Yol. On leaving this point it follows the old Turco-Bulgarian frontier up to Balaban Bashi, west of the river Tunja, and north of the village Dervishka-mog.

The new frontier here diverges from the old, in the environs of Balaban Bashi, and descends in a straight line towards Dermen Dere. The frontier line, after leaving Dervishka-mog in Ottoman territory, follows the course of the Dermen Dere to Bulgar Lefke, and leaves this village in Bulgarian territory. Skirting the east and south of Bulgar Lefke the frontier leaves the course of the Dermen Dere, and trends to the west, keeping in Ottoman territory the villages of Turk Lefke and Dimitri Keui. It follows the watershed between the Bukdere and the Demirhandere (crest 241), and arrives at the northernmost point of the bend of the Maritza, east of Mustafa Pasha. The head of the bend is 3½ kilometres from the eastern end of the Bridge of Mustafa Pasha.

The frontier follows the western loop of the bend to the mill, and thence taking a straight line, reaches the Chermen Dere north of the railway bridge (the Chermen Dere is the stream flowing into the Maritza 3 kilometres east of the village of Chermen), and then winding round Chermen to the north, continues to Tazi Tepesi.

The frontier leaves Chermen village to Turkey, and, following the Chermen Dere, cuts the railway line north-west of Chermen. It follows the Chermen river and ascends to Tazi Tepesi (crest 613). The point where the Chermen Dere cuts the railway north-west of Chermen is a distance of 5 kilometres from the centre of the village of Chermen, and 3200 metres from the western end of the bridge of Mustafa Pasha. The frontier leaves in Ottoman territory the highest point of Tazi Tepesi, and from this point follows the watershed between the rivers Arda and Maritza, through the villages of Yailajik and Gjuldzuk (Goldzik or Geuljik), which remain in Ottoman territory.

Leaving Goldzik the frontier passes crest 449, then descends to crest 367, and leaving the latter runs towards the Arda in a southerly direction almost in a straight line. This line passes 1 kilometre to the west of Bertasli, which remains in Ottoman territory. The line having reached the Arda, follows the right bank of that river westward to the mill, 1 kilometre south of Cingirli. From the mill, it follows the watershed east of Gajdohordere, passing 1 kilometre east of the village of Gajdohor, leaves Drebisna to Bulgaria, and passing about 1 kilometre east of this village, descends to Aterendere and a point 1 kilometre south of the village. From there it goes in a south-westerly direction by the shortest route to the source of the stream which flows between the villages of Akalan and Kajliklikeui, and follows the "thalweg" of this stream to descend to the Kizildeli river.

From this river the frontier, leaving Gökcebunar (Geukjebunar) to Bulgaria, ascends the course of the Kizildeli Dere, until the "thalweg" is reached of a tributary stream to the south, situated 4 kilometres south of Mandrica, and 3 kilometres east of Soganliki-bala, whence it ascends to the source of the same stream, and then descends by the shortest route to the source of the Mandra Dere; thence it follows the "thalweg" of the Mandra Dere from its source to join the Maritza west of Mandra. On this section the village of Krantu remains in Bulgarian territory, and the villages of Basklisa, Ahirjanbunar, and Mandra are restored to Turkey. On leaving this point the frontier follows the "thalweg" of the Maritza to the point where the river divides into two branches at 3½ kilometres south of Kaldirkoz. From there it follows the "thalweg" of

the right branch, which passes not far from Feredzik (Ferejik), and thus reaches the Ægean Sea.

In this section, the marshes of the Ak-su, as well as the lakes of Queneli Gheul and Kazikli Gheul, remain to Turkey, while the lakes of Tuzlagheul and the Dranagheul are ceded to Bulgaria.

## TREATY OF BUCHAREST.

25th July (7th August), 1913.

### Serbo-Bulgarian Frontier.

Austrian Staff Map, $\frac{1}{200000}$.

The new frontier starts on the north from the former Turco-Bulgarian frontier at the point Pataritza, and follows this frontier to Dizderitza, after which it follows the watershed between the rivers Vardar and Struma, passing by Lukov Vrh (1297), Obel, Polyana, the crest 1458, the crest 1495, Zanoga (1415), Ponoritza Kaditza, the crest 1900, the crest 1453, Chingane Kalesi, the crest of Klepalo, the crest 1530, the crest of the Malesh Planina (1445), then turns to the west towards the crests 1514 and 1300, passes along the crest of the Draganeva Dagh, Kadi Mezar Tepesi, Kale Tepesi, crosses the river Novishanska to the south of the village of Rayanche, passes between the villages of Oslovche and (Zlevo) Sushevo, crosses the Strumnitza river between Radishevo and Vldovche, and then ascends to the crest 850, whence it again follows the line of the watershed between the rivers Vardar and Struma along the crests 957, 571, 750, 895 and 850, and thus reaches the crest of the Belashitza mountain, where it joins the Greco-Bulgarian frontier.

### Greco-Bulgarian Frontier.

Austrian Staff Map, $\frac{1}{200000}$.

This line commences on the summit of the Belashitza Planina, where it joins the Servian and Bulgarian frontiers; follows this crest, then descends the spur to the north of Yurukleri to the junction of the Struma with the Bistritza river, ascends the course of the latter river, then turns to the east to Chengane Kalesi (1500). From thence it reaches the crest of Ali Butush (point 1650), and follows the watershed through points 1820, 1800, 713, to Stragash.

From thence, still following the watershed, the frontier turns north, and then north-east to follow the watershed between points 715 and 660, then passes the points 1150 and 1152; whence following the crest to the east of the village of Rakishten, it crosses the Maritza, ascends to the summits of Rusha and Zeleza, crosses the Dospat (Rana) Suyu, and thus reaches Chuka. From this point onward it rejoins the watershed line, and passing by Sibkova Chadirkaya (1750), Avlika Dagh (1517), Kayin Chal (1811), Debikli (1587), descends towards the south to the point 985, and then turns eastward south of the village of Karovo; from thence it passes north of the village of Kaibovo, turns north, and traverses the crests 1450, 1538, 1350 and 1845. Thence it turns south and passes by Chigla (1750) to Kushlar (2177).

On leaving Kushlar the frontier follows the watershed between the Mesta river and the Yazi Euren Dere along the Ruyan Planina, to the Akhlat Daghi (1300), thence it follows the crest which descends towards the railway station of Okjilar (41), and from this point the frontier follows the course of the Mesta river to the Ægean sea.

## TREATY OF BUCHAREST.

### Frontier of Bulgaria and Rumania.

Rumanian Staff Map, $\frac{1}{200000}$.

The frontier leaves the Danube at the head in the interval between the two islands situated north-east of Iezer Kalimok. The villages along the frontier line are distributed as follows:—

*To be left to Bulgaria.*—Breslen, Kütüklü, Güvedze, Nastradin, Kascilar, Kaslakeui, Dzeferler, Kara Kodzalar, Junuzlar, Seremetköj, Jeni Balabanlar, Eski Balabanlar, Saladin, Kadir, Jükli, Ferhatlar, Saltiklar, Coban Nasuf, Sarvi, Mahmuzli, Kücük Ahmed, Bestepe, Peceli, Burhanlar, Kizildzilar, Gökce Döllük, Kapudzi Mahle, Korkut, Canlar, Emirovo, Semat, Botjovo (Jusenli), Kara Bunar, Ermenli, Krumovo (Kumludza grn), Yeni Mahle, Vlahlar, Klimentovo (Kapakli), Dis Budac, Bel Monastir (Mon Aladza).

*To be ceded to Rumania.*—Türk Smil, Sjanovo, Hadzifaklar, Kovandzilar, Mesim Mahle, Kara Mehmedler, Salihler, Köse Abdi, Kanipe, At Serman, Ova Serman, Omurdza, Taslimah, Rahman, Asiklar, Ibrjam Mahle, Cijrekci, Kara Kadilar, Kili Kadi, Trubcular, Ekisce, Vladimirovo (Deli Osmanlar), Serdimen, Kadijevo, Novo Botjovo. Semiz Ali, Saridza, Balidza, Kujudzuk, Mustafa Bejler, Causkjöj, Ekrene.

### Detailed Trace of the Frontier

Reference: Rumanian Staff Map $\frac{1}{100000}$.

On leaving the Danube the frontier is first defined by the lower edge of the terrace of the left bank of the valley separating the village of Türk Smil from that of Kutuklu. It then ascends the spur north of the Kutuklu-Senovo road, crosses the centre of the three hillocks west of Senovo village, winds round the heads of the two valleys south of Senovo, and then descends to the mouth of the valley west of Hazcilar, which it ascends to its source. The line then crosses the valley of Hadzifaklar, and so across the plateau skirted by the Razcilar-Balbunar road. Between this road and the crest marked 209 it crosses valleys, first to the west and then to the east of Kuvanojilar, between which it winds along following the watershed between these two valleys.

Passing just south of the Trig. point 209, the line runs towards the central bend of Demir Babinar stream east of Seremetkioi, which it reaches, having crossed the hillock, south-west of Trig. point 209, and having followed the valleys and their confluents nearest to a straight line joining Trig. point 209 to the crest marked 226, north of Seremetkioi, east of the Demir-Babinar stream, the frontier follows the spur between Kïuseabdi Kasapla and Eski Balabanlar, crosses first the valley and then the plateau east of this valley, passes between the villages of Atkioi and Saladinkioi. The frontier then crosses the hillock north of Kaidarkioi (on the Silistria road), and reaches the confluent of the valley north of Jüklü, then reaches the Shumla-Silistria road south of the crest 269 △. It curves first west and then south and east of Rahman Asiclar, passing along the confluents of the depressions in the manner best suited for arranging that the frontier shall pass at about equal distance between the various villages which the line will separate in this particular district. On leaving 269 △ the frontier passes between Dorutlar and Cioban Nasuf, descends to the junction of the two first valleys east of Cioban Nasuf, follows the spur flanked by these two valleys, continues south-east along the thalweg of the valley, debouching into the Revnagol river north-west of Mahmuzlai. It descends the course of this river to the

tributary north-west of Mahmuzlai, which it ascends, and passes south of the hillock 260, whence it descends into the valley of Kiuciuk Ahmed to reach the fork of the roads there.

Having followed for a little the course of this valley, the frontier ascends the spur between Kiuciuk Ahmed and Killi Kadai, crosses the hillock 260, and reaches the junction of the two valleys west of Ekisce, ascends the valley west of this village, then changes its direction to the south, crosses the hillock 277, and then the col between the two hillocks between Vladimirovo and Gekcidelink; it then crosses the col between Gekcidelink and Kapuji Mah,* whence it turns first to the north and then east, following the depression north of Kortut (Korkut).

Between Kortut and the Isikli stream the frontier follows the watershed south of the village of Kadikeui, and the crest 303 up to the sharp bend of the Isikli stream. In the following section, which terminates at the road from Varna to Dobrici, the frontier follows first the course of the Kumbudja valley, then the eastern branch of that valley, and passes north of the hillock 340.

The final section of the frontier between the Varna-Dobrich road and the Black sea crosses at its source the valley of Kuiudjuk, follows a small spur, then a valley in a south-easterly direction. It then bends to the north-east in the direction of the crest 299, following the line of the water-parting. Then it separates the lands of the villages of Ciauskioi and Kapaklü, and after having in the same manner separated those of Mustafa Beiler and Vlahlar, it finally reaches the Black sea, traversing the col situated to the south of crest 232.

## AREA AND POPULATION OF THE BALKAN STATES.

### Area.

Before the war, Turkey in Europe had an area of 63,100 square miles, and of this 8644 square miles still remain in the Vilayet of Adrianople under Ottoman rule.

Bulgaria has acquired 8851 square miles as new territory, an important area providing access to the Ægean, but has ceded to Rumania 2969 square miles of some of her best arable land.

Greece, on the mainland, has acquired 16,919 square miles of new territory.

Servia has added 15,241 square miles to her former territory,

Montenegro has obtained 2129 square miles of new territory, mostly from the old Sanjak of Novibazar.

The new state of Albania has an area of 11,317 square miles.

Thus the present area of the Balkan States is as follows:—

| | Square miles |
|---|---|
| Bulgaria ... ... ... ... ... ... ... | 43,310 |
| Greece ... ... ... ... ... ... ... | 41,933 |
| Servia ... ... ... ... ... ... ... | 34,000 |
| Albania ... ... ... ... ... ... ... | 11,317 |
| Turkey ... ... ... ... ... ... ... | 8,644 |
| Montenegro ... ... ... ... ... ... ... | 5,603 |

* In the map of the frontier, entitled "Frontière entre la Bulgarie et la Roumanie: Tracé Détaillé," Proces-verbal joint au protocole No. 5, du 22, Juillet/4 Août 1913 et protocole annexé à l'art. II. du Traité de paix du 28 Juillet/10 Août 1913, scale $\frac{1}{100000}$, supplied to the Society by the Rumanian Government, a slight alteration in the printed red line of the frontier has been made here in black ink. It is in favour of Bulgaria, and makes the line pass slightly east of the col here referred to. This alteration is attested by the signatures on the face of the map of the four delegates who determined the frontier line.

### Population.

In view of the losses in the wars and the subsequent migrations of various nationalities, it is somewhat difficult to arrive at exact estimates of the present population of the Balkan States. The following figures are, however, a close approximation, mainly from official sources.

In *Turkey in Europe*, before the war the population was 6,130,200, but now there remain some 640,000 under Ottoman rule in Eastern Thrace outside Constantinople. If the capital is included, Turkey in Europe numbers 1,590,000 inhabitants. The population of *Bulgaria* before the war was 4,337,516; in the new territory a population of 415,490 has been added, while 286,000 have been ceded to Rumania; so that the present population of the country is 4,467,006.

*Rumania*, before the war, had a population of 7,228,976, and having acquired 286,000 in the new territory, she has a population of 7,514,976.

*Servia* before the war had a population of 2,911,700, and in her new territory has acquired 1,636,290, making her present population to be 4,547,990.

*Greece* had a population of 2,733,000 before the war, and has added 1,630,000 in her new territory, making her present population 4,363,000.

In her former territory, *Montenegro* had a population of 286,000, has added 230,000 in the new territory, making a present total of 516,000.

The newly constituted State of Albania has a population of about 1,000,000.

Thus the present population of the Balkan States is as follows:—

| | |
|---|---|
| Turkey-in-Europe ... ... ... ... ... | 1,590,000 |
| Bulgaria ... ... ... ... ... ... ... | 4,467,006 |
| Rumania ... ... ... ... ... ... ... | 7,514,976 |
| Servia ... ... ... ... ... ... ... | 4,547,990 |
| Greece ... ... ... ... ... ... ... | 4,363,000 |
| Montenegro ... ... ... ... ... ... | 516,000 |
| Albania ... ... ... ... ... ... ... | 1,000,000 |

## THE HISTORY OF PTOLEMY'S MAPS.

The untiring researches of Father Joseph Fischer into the MSS. of Ptolemy's Geography still in existence in European and American Libraries, to which reference has frequently been made in the *Journal*, have opened up an entirely new field for investigation, and one which is likely to occupy the energies of students for a long time to come. Now that the collection of the material has been practically completed and the formidable task of co-ordinating it and making it generally accessible has to be faced, Prof. Fischer has secured the collaboration of Prof. Paul Dinse, to whom he has made known the general results of his inquiries, and who will assist him in the part of the work still remaining to be done. Some of the general results were outlined by Prof. Fischer at the Innsbruck meeting of the German *Geographentag*, and (as subsequently published in *Petermanns Mitteilungen*) were recorded in this *Journal* at the end of 1912 (vol. 40, p. 649). A somewhat more detailed statement, with a special discussion of the question of the history of the maps associated with the Geography, was recently put before the Berlin Geographical Society by Prof. Dinse at a meeting in which several of the best-known students of the subject in Germany took part (*Zeitschrift*, Berlin Geographical Society, 1913, No. 10).

It will be remembered that the most striking result of Prof. Fischer's investigations is the disclosure of quite a series of MSS. which take us back considerably

nearer the original form and subject-matter of Ptolemy's work than the Italian copies of the Renaissance on which the attention of students has mainly been concentrated. Of some thirty Greek MSS. of the Geography now known to us thirteen only contain the maps in whole or in part, and of these only seven are sufficiently old to have been actually in the hands of Greek owners. Of these seven a first group consists of three items, viz. the Mount Athos codex, another of about the same age (late thirteenth or early fourteenth century) in the Urbinas collection in the Vatican, and a third in St. Mark's Library at Venice, probably about a century later. These all contain the usual twenty-seven maps known to us from the early printed editions. A second group of four (five if we include a later copy of one of the others) is represented by a codex in the Laurentian Library at Florence, others being found at Milan, in the British Museum, and at Constantinople. In this group the twenty-seven maps are replaced by a quite different series, numbering, when all are present, no fewer than sixty-eight, of which sixty-three are special maps, while five are general maps of the World, Europe, Africa, and North and South Asia. The special maps are mostly of smaller districts than those of the better known type.*

Prof. Dinse gives a somewhat detailed description of the maps in the Urbinas Codex, which, he says, indicate a surprising degree of skill and technical knowledge on the part of the draughtsman. This suggests the question whether we really have in them (or rather in the originals from which they are descended) an actual product of Ptolemy's own time. Against this supposition arguments have been based on the absence of maps from the oldest MSS., and the fact that the projection used for the maps in the existing Greek MSS. does not conform to the requirements laid down by Ptolemy. As is well known, a statement occurs in some of the MSS. that they are the work of one Agathos Daimon (or Agathodaemon), who has been identified with an obscure grammarian of the fifth century A.D., and credited with the original construction of the maps on the basis of Ptolemy's text. This view is not accepted by Prof. Dinse, who lays stress on the consideration—the force of which must have been obvious to most students of the question—that the construction of some sort of maps must have been a necessary preliminary to the preparation of the tables given us by Ptolemy. He thinks it impossible that the Geography in its complete form can ever have existed without maps, and dwells on the difficulty, if not impossibility, of making the latter on the basis of the tables alone.

Prof. Dinse holds that the absence of maps from the earliest known MSS. is no proof that maps did not originally accompany the work. While the text could be reproduced with small trouble, the maps would make much more demand on the copyist, and many, perhaps most, of the later copies would be without them. Ptolemy's recommendation of the conical projection, in preference to the equidistant cylindrical projection of his predecessor Marinus, would apply chiefly to the general map of the world, for which the conical projection *is* used in the MSS. For maps of limited areas, a strictly scientific method would not be so necessary, and the sixty-three district maps of the second type of MS. may quite well be considered to represent the original form of delineation, by Ptolemy or under his direction. Somewhat later the twenty-six maps of the other type would be evolved with a view to giving a connected view of somewhat larger areas; but the two series probably existed side by side from a very early date.

* At least one example of the 68-map type was known to C. Müller, who included it in his list printed in the *Archives des Missions Scientifique et Littéraires;* but he attached no special importance to it on the score of the maps.

It has been suggested that Agathodaemon was the skilled draughtsman whose aid Ptolemy sought for the mechanical part of the work, but Prof. Dinse does not think this so likely as that he was an expert copyist of a somewhat later date who saved the Geography for posterity by committing it to a more durable medium than the papyrus rolls in use in Ptolemy's time and after.

Steps have already been taken to make available to students the hitherto unpublished maps of the most important MS. of the first type, and when all Prof. Fischer's copious material is given to the world, many new lines of inquiry will be opened up. In particular it will be necessary for competent scholars to undertake *de novo* a critical study of the text of the Geography.

Prof. Dinse's conclusions appear generally acceptable, and met with considerable support in the discussion which followed the paper, though Prof. Kretschmer still prefers to regard Agathodaemon as the original maker, rather than a mere copyist, of the maps.

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# REVIEWS.

## ASIA.

### Ethnology of Cochin.

'The Cochin Tribes and Castes.' Vols. 1 and 2. By L. K. Anantha Krishna Iyer. Madras: Higginbotham. 1909–11.

These volumes are a valuable addition to the lengthening series of works on Indian ethnography started by the late Sir Herbert Risley, and they deal with a part of the country regarding which detailed information, especially about the lower classes, was much needed. The author is not only a specialist in these investigations, but also an enthusiast, flavouring his minute and painstaking observation with illustrations and comparisons derived from a wide knowledge of the general subject to which he has devoted many years of study. His work is prefaced with interesting and valuable comments by Dr. A. H. Keane and Prof. Haddon, the former of whom takes the opportunity of restating views upon the obscure question of the origins of the dark races of India, which, though relevant to the general scope of the book, are somewhat too controversial to be discussed here.

Mr. Anantha Iyer wisely opens his inquiry with the lower classes of the Cochin peoples, quoting the now generally accepted, but none the less regrettable, view that no time must be lost in studying the beliefs, languages, and customs of the more primitive communities of India, or they will be found unrecognizable, in the rapid transformation which they are now undergoing. In the case of the comparatively small forest population of eastern Cochin this process is very apparent in the account here given, and the influences to which it is due are clearly indicated. The second volume deals with the middle and upper classes, and the third, still to be published, will contain the anthropometrical record, to which students will look forward with interest.

The character, institutions and pursuits of the inhabitants of Cochin, in common with the rest of the Malabar tract, have been determined to an unusual extent by the geographical features of their country. The latter is cut off from the open region to the east by forest-clothed mountains through which there is easy access by one great gap only. Between mountain and sea lies a strip of flat land, formerly covered with jungle, and even now well wooded. The coast, though without deep and well-protected harbourage, is indented with the backwaters or lagoons which are a well-marked feature of the Malabar

coast. The rainfall, derived from the full force of the south-west monsoon, is copious and unfailing. The hill tracts in the east of the state, now mostly under forest reserves, shelter numerous though small tribes under primitive conditions. The inland parts of the lowlands are chiefly under rice, whilst a broad coast belt is given up to the coco-palm, and the sea supports a considerable fishing population. The fertility of the soil and the favourable climate enable the 1360 square miles of the state to sustain a steadily growing population of 675 to the mile. Even in the forest tracts the density reaches the remarkable figure of 320, whilst in the rich tract along the coast this figure rises to more than 1800. This is due chiefly to the supremacy of the coco-palm, since, in addition to those engaged in the actual cultivation of this national product, an almost equal number live by the preparation of the fruit and fibre and the extraction of the oil, not to mention the juice for toddy and arrack. To the prevalence of this special cultivation, again, may be attributed, in part at least, the custom of dwelling in detached homesteads.

This isolation has enabled the population of Malabar to develop socially upon lines peculiar to itself and of the highest interest to the student of ethnology. All the more important elements in the population are of foreign extraction, though centuries of settled life have altogether obscured trustworthy tradition of the regions to which the respective communities originally belonged. The nearest approach to autochthony is probably found, as in other parts of India, in the classes till recently held in predial servitude, such as the Pulayan. A few of the forest tribes, too, are remnants of the earliest inhabitants of southern India and Ceylon. The bulk, however, of the lower classes seem to be offshoots of larger bodies in the Tamil country, thickly overlaid with the fruits of miscegenation with their local superiors. The most interesting communities here, the Nayar and the Nambutiri Brahman, are of far more distant origin. Both are generally believed to have come down from northern India, but, while the Brahman has retained its character as a well-defined and exclusive body, the Nayar has lost its racial and tribal identity. In a small and closely packed population like that of Cochin, social rite and ceremonial are very contagious, and it is only to be expected that the distinctive pre-Aryan customs and beliefs should be heavily overlaid with Brahmanical practice. On the other hand, such peculiarities as still stand out from the general accretion of orthodoxy are of so tribal or local a character that, however interesting in themselves, they contribute relatively little to comparative ethnography. This, however, in no way detracts from the merits of the work as a valuable monograph, still less from the industry and acumen of the author.

J. A. B.

### North-West Borderlands of China.

'Wissenschaftliche Ergebnisse des Expedition Filchner nach China und Tibet, 1903–5.' Vols. 2, 3, 4, 5, 7, 9. Maps. China: Parts I., II. N.-Ost Tibet, Parts I.–IV.

A short account of this journey, derived from letters, published in the *Zeitschrift* of the Berlin Geographical Society, from Lieut. Filchner's companion, the geologist Dr. Tafel, was given in this *Journal*, vol. 25 (1905), p. 562. In his 'Ratsel des Matschu' (Riddle of the Yellow River), and 'Kloster von Kumbum' (The Kumbum Temple) and two parts of the 'Ergebnisse' published in 1908, Filchner gave a general account of the journey (*vide Geographical Journal*, vol. 31, 1908, pp. 90–91), together with a history of the famous temple of Kumbum, and some information on the zoology and botany of the districts traversed. The volumes now published almost complete the

survey of the work undertaken by Lieut. Filchner, whose absence in command of the German Antarctic Expedition entailed his placing the editing of some of the volumes in hands of friends and scientists, who have most loyally responded to the trust.

The journey in question was undertaken with a view to obtain full geographical information on what he fairly described as the most important unknown area in the whole of the interior of Asia, that traversed by the upper course of the Hwang Ho and stretching southward from this towards the mountainous border of northern Sechuen.

In vol. 2, an account is given of the author's journey from Lan-chou Fu in Kansu to Si-ning Fu on its western border. The itinerary of the route, histories of those two important cities and descriptions of them at the time of his visit, are combined with a large number of photographs and sketches, illustrating the journey of the travellers along the valleys of the Yellow and Si-ning rivers to Si-ning Fu. A few photographs are also given of the mountain scenery on the route from Si-an Fu to Lan-chou. The system of irrigation in use near Lan-chou by huge water-wheels to raise water to flood canals was found to extend with interruptions along the river-valleys as far as Si-ning, and to produce startling contrasts with the bare lands where irrigation does not exist. Very interesting descriptions are given of the many people from the west who meet in Si-ning, and the desolating effects of the Mohammedan rising in 1905 are well portrayed, together with the methods of repression practised towards the survivors of the war. Many differences in the customs of the Chinese women in north-western Kansu from those elsewhere are mentioned, and a pleasant account is given of the relations quickly established by Lieut. Filchner's wife, who accompanied the expedition as far as Si-ning, not only with Chinese women, but also with representatives of the many tribes of north-eastern Tibet whom she met there.

Though no description is given of the earlier part of the travellers' journey, from Hankow to Lan-chou Fu, no less than thirty-eight sheets of maps on a scale of 1:44,000 are devoted to the route between Lao-ho-kou on the Han river and Si-an Fu. These are further supplemented by numerous sketches of profiles of the mountains passed.

Some slight difficulty in following the narrative of the journey through China is occasioned by a new system of transliteration of Chinese names, adopted on Prof. Hirth's advice. The importance of place-names being correctly rendered is recognized in Band II., which is specially devoted to this subject, and invaluable assistance is given through the furnishing of the Chinese characters of such names. But the novel system of transliteration seems to have made unfair demands on the proof-reader, and is probably the occasion of such oversights as occur in the rendering of the great Kansu range of Liu Pan Shan (Plates 1083–4), the not infrequent occurrence of Jang-tse instead of Yang-tse, and a still more serious blunder of the same nature in the name of the author of 'Cathay and the Way Thither' (p. 6).

The most valuable part of the work done was accomplished after the explorers had left Si-ning Fu. The maps of the country traversed are divided into four parts: (1) Shara-Kuto to Toson Nor; (2) Toson Nor to Oring Nor; (3) the part of the Yellow river basin fed by the Kiang-, Ri-, and Yach-chu rivers; (4) Yach-chu to Sung-p'an-ting. These maps have reached a standard of perfection which is seldom realized. They include route maps, forty-six sheets of maps on a scale for the most part of 1:75,000, and a general map which acts as a key to these sheets, which, by the way, it is necessary to keep at hand, as the

numbering of the sheets is not always in the natural order. On the journey west from Si-ning, Filchner was able to compare his observations with those of the Russian travellers Prjevalski, Roborovski, and Koslof, of M. Grenard, and Mr. Rockhill, and the differences in the positions and altitudes given by them are strikingly small. In the latter half of the journey Filchner was almost entirely on new ground, and had little opportunity of checking his observations by those of others. The system of triangulation which he followed is shown in detail in the maps, and with a clearness which overcomes the complexity of the network of lines which traverse the ground treated. These lines have been left in order to assist future geographers to correct any errors in the maps of parts of the country which had not been actually visited.

But the length of time spent by Filchner in observation at his different camps, the determination of several positions by astronomical observations, the wide panoramic views frequently obtained from peaks of 15,000–16,000 feet, the photographs taken from their summits, the bearing of prominent positions, and more especially of the Ice Giant (5600–6000 metres) in the Amne Machin range, viewed from widely different points of view, would seem to preclude the possibility of errors, were it not for the author's own experience of the manner in which the course of rivers may lie hidden from the eye and only be detected by the map-maker when putting together the pieces which formed the puzzle of the Ma-chu.

Filchner has given the name of Kaiser Wilhelm Gebirge to the range which divides some of the headwaters of the Yang-tse from those of the Yellow river, and which has been spoken of by different explorers as the Bayan Kara, the Wodorasdel, and the Bayan Kara-ula. The rivers Ri-chu and Kiang-chu, which flow from the northern slopes of this range, were traced by him from their headwaters almost to their confluence with the Ma-chu, and the course of another great tributary, the Da-chu, was followed by him upwards with the intention of crossing the range and continuing his journey thence to Sung-p'an-ting.

This project was, however, baulked in part by the hostility of the natives, and Filchner was forced to retrace his steps to the Ma-chu and follow its confined valley to Gotshun Gomba, and thence hurry on, in constant fear of attack, through Waser and Meitsang to Sung-p'an. In the Ngaba country he was plundered of his instruments and many other valuables, and the tracing of the road which he followed was from that point mainly dependent upon compass bearings. But fortunately Mr. Li, a Chinese whom he had sent to Lan-chou by a southern route after the attack in the Da-chu valley, crossed Filchner's road near Meitsang, and the notes which he was able to take of the road travelled by him served in some measure as a check on the correctness of Filchner's distances.

From information which he gathered on the route Filchner was able to confirm the truth of Roborovsky's supposition, in 1895, as to the bend made by the Yellow river round the Amne Machin mountains lying much further east than it is placed in maps, and the position which he assigned to it, about 102° E., 33° 30′ N., fairly agrees with that given by Dr. Ollone when he visited it in 1908. The identification of the Mai-chu river which rises in Sechuen and joins the Yellow river in lat. 34°, after receiving the Pra-ho at Toma, was another important discovery made on this portion of the journey, but the later stages were made in hurried marches due to the necessity of securing further supplies for his exhausted party.

The high value of the work done on the expedition, and the fact that so

large a portion of it was on new ground, justly entitled Filchner to call the mountain ranges which he defined or discovered by the names of those whom he held in high honour, but it seems a matter of regret that ground for confusion should be given by naming a small range north of Kaiser Wilhelm Gebirge after his esteemed master, the late Baron von Richthofen. It ought, perhaps, to be mentioned that the scheme on which the maps are prepared was outlined by that great geographer, who considered it the duty of map-makers to fill in so far as they can, from their own observations of what they have actually seen, orographical features of the country which they have not been able to explore, but on which their experience enables them to form a judgment.

It is hardly possible to conclude without a reference to the subsequent journeys undertaken by Dr. Tafel in the same region.* An excellent group of maps of the portion of the Yellow river which he visited in China has recently been published by the Geographical Society of Berlin. The publication of the portion dealing with his journeys in Eastern Tibet is awaited with great interest.

W. R. CARLES.

## AFRICA.

### BANTU PEOPLES OF FRENCH EQUATORIAL AFRICA.

'Les Sociétés Primitives de l'Afrique Equatoriale.' By Dr. Adolphe Cureau. Paris: Librairie Armand Colin. 1912. *Illustrations and Sketch-map.* 6 *fr.*

Adolphe Cureau died last November at the age of forty-nine. One of the pioneers under de Brazza, all his career had been passed in French Equatorial Africa. A doctor of medicine, an ethnologist and philologist as well as an administrator, he had studied closely the peoples he was called upon to govern. This book, written about a year before his death, shows that Dr. Cureau had obtained a much better understanding of the mind of the Negro than is usual among officials. Desiring to present a picture of a race untouched, as far as that is possible, by outside influences, the author practically confined his treatise to the Bantu peoples of French Equatorial Africa and those of the neighbouring districts of Belgian Congo. Thus we have nothing about the non-Bantu tribes, Mohammedanism, or Christian Missions. We are given the rare opportunity of seeing the extent of the progress towards civilization made by a race shut off from contact with the outer world. Dr. Cureau is no simple delineator of "manners and customs" of primitive peoples; he treats his subject synthetically, proceeding from the individual to the family, from the family to the village, from the village to the state; only that among these people states properly so called hardly exist. There is no need here for an examination of these brilliant studies in psychology and sociology, this presentment of a race in a condition of culture from which the majority of humanity emerged in a past more or less distant. One gathers that Dr. Cureau believed that in time—a long time no doubt—the Negro may attain to a civilization equal to that of any other people. We note with pleasure the weight given by the author to the geographical factors affecting the development of mankind. He displays this scientific spirit by sketching "le milieu" in the opening pages of his first chapter, and then, when he comes to the races, insisting at the outset on the distinction between men of the plains and forest tribes.

F. R. C.

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* Vide *Geographical Journal*, vols. 27, 28, 29, 30.

## Egyptian Irrigation.

'Egyptian Irrigation.' By Sir W. Willcocks and J. I. Craig. 3rd edition. 2 vols. London: Spon. 1913. *Maps and Illustrations. Price 42s.* net.

The third edition of this work has been brought out under the joint authorship of Sir William Willcocks and Mr. J. I. Craig, whose full qualifications for their task are set forth in the Introduction written by Sir Hanbury Brown. Irrigation is so vital and all-pervading a matter in Egypt that it is not surprising to find a wide range of subjects dealt with in the book. Geology, meteorology, physiography, agriculture, and finance are all matters of concern to the irrigation engineer as affecting his peculiar province of irrigation, drainage and land reclamation. Therefore all these subjects are duly discussed. Two chapters—ii. and iii.—dealing with the hydrology of the Nile, constitute an interesting and valuable geographical record, and contain figures, relating to discharges, levels and the dimensions of channels, of the greatest value to those whose duty it may be to work out projects for the further development of the resources of the Nile.

The next two chapters—iv. and v.—are devoted to basin irrigation. Much of their contents is interesting as past history, but has ceased to convey lessons for the future in consequence of recent developments. Since the Aswan dam was built, the greater part of the Middle Egypt basins has been converted to land perennially irrigated, so that the formidable operations of filling and emptying this formerly extensive system of basins are things of the past. Moreover, the conditions affecting the basins which remain unconverted, have been much improved by the construction of the Assiut barrage, and also by the reduction of the area to be served. The conditions also of basin irrigation in the more southerly provinces have been made more favourable by the construction of the Esna barrage. It seems almost a pity that the publication of this work was not delayed two or three months, so that the levels of the abnormally low flood of 1913, and the beneficial effect of the Nile barrages on such unprecedentedly low levels, might have been placed on record therein.

At the present stage of Egypt's development, perhaps the most important problem is that of drainage and land reclamation, which is discussed in chapter vii. It is accepted by all that the low-lying lands of the north of the Delta cannot be efficiently drained, or even drained at all, without pumping. The problem of providing efficient drainage to all lands in the Delta is complicated by the necessity of also providing a liberal supply of rich flood water to them. Anxiety is expressed on the ground that the project adopted by the Egyptian Government makes inadequate provision for this necessary flood-water supply, and also contemplates the extravagant proceeding of pumping a large proportion of escape and drainage water which gravitation is ready to dispose of gratis if its services are accepted.

Interesting chapters dealing with the most important Nile works will be found in volume 2. On the concluding pages of chapter xii. will be found proposals for the further husbanding of the Nile waters. The projects discussed are of great interest and importance. The proposal to scrap the Aswan dam and to substitute for it a higher one will probably receive little support, at any rate from the generation to which the author of it belongs. This has probably been realized, as an appeal is made to "posterity" to adopt the graceful cornices inspired by Egyptian skies and temples rather than the bald copings born of memories of Stonehenge under the depressing influence of London fogs.

Sir W. Willcocks has naturally much to say about the Aswan dam, of which

the original designs were prepared by him. His criticisms of "the Raised Dam" have been contested in the pages of the *Engineer* during 1913, and matters of fact are in dispute. Apart from the controversial matter, however, 'Egyptian Irrigation' is a storehouse of information stocked by men of undoubted capacity, where the irrigation engineers of Egypt, and others too, will find all that they need to know to best prepare them for the teachings of experience.

H. B.

## AMERICA.

### Mount McKinley.

'The Conquest of Mount McKinley.' By Belmore Brown. New York and London: G. P. Putnam's Sons. 1913. *Maps and Illustrations. Price* 15*s. net.*

The author of this fascinating book of travel objects, at starting, to the name of one who never saw Alaska being given to the highest mountain in North America. All good geographers will agree with him. The simplest method of removing the objection would be to call it by some other name—a suggestion which may well be left to the American Geographical Society.* It is not easy for Swiss and Himalayan mountain climbers to realize the extraordinary difficulties involved in the attainment of an altitude such as that of Mount McKinley (20,300 feet) under Arctic conditions, and in such surroundings as those presented by the Alaskan range. Three attempts were made, two of which, in 1906 and 1910 respectively, were directed against the southern face of the mountain, and ended in failure. The southern approaches were found to be impassable. Incidentally, the exact position reached by Dr. Cook in the first expedition, when he claimed to have reached the summit, was identified; and his claim to be the first to surmount America's highest peak was thereby disposed of for good. The third expedition in 1912 was successful, and Mr. Belmore Brown, with two companions, did eventually reach the summit ridge of Mount McKinley, after almost incredible exertions. It seems ungracious to refer to the fact that they did not actually stand on the top of the highest "dome," although they were but a few minutes' walk from it. The terrific violence of the Arctic blizzard which met them on the summit when absolutely exhausted with the strenuous efforts of the climb obliged them to huddle together in the lee of that last rise, and finally to retreat hastily whilst strength was left in them to reach their 15,000 feet camp. "The most conservative of our estimates," says Brown, "of the climatic conditions we fought against was a wind of 55 miles an hour and a temperature of 15° below zero." Frost particles were driven right into their clothing. This last ascent was made from the northern side of the mountain, and as the explorers started from Cook's inlet on the south, following the course of the Susitna river, it involved crossing the Alaskan range before a possible way to the summit was opened up. The interest of the book lies not only in the picturesque and fascinating descriptions of Arctic sport and travel with which it abounds, but in the very careful details of the equipment and arrangements necessary to enable explorers to tackle a wilderness of untrodden mountain country where every pound of food and every article of equipment has to be carried on their backs. Dogs and sledges were infinitely useful as far as they could go, and some of the best stories in the book are concerned with this method of travelling; but the actual mountaineering over unexplored ice-

* Archdeacon Stuck, whose ascent to the actual summit was described in the *Journal* for January (p. 83) and whose narrative has since appeared in book form, pleads for the retention of the native name "Denali."

fields and glaciers under the handicap of heavy loads and in face of Arctic conditions of wind and weather may safely be reckoned the most strenuous form of mountaineering known to the world-wide adventurer. No such interesting work on the great northern ice wilderness has appeared for a long time.

T. H. H.

### British North America.

'Visual Instruction Committee Handbooks. No. 4. Canada and Newfoundland.' Seven lectures prepared by A. J. Sargent. London: Geo. Philip & Son, Ltd. Pp. 117. *Maps and Photographs. Paper, 8d. net; cloth, 1s. net.*

This handbook is prepared to accompany a set of lantern slides, 426 in number, which have been specially selected to make known to the children of other parts of the British Empire the multiplicity of conditions and people which combine to make Canada. The variety of physical features, the differences in the reaction to environment in the apparently self-contained villages of French Quebec, and in the farming areas of the prairies; the fisheries, the mines, and the different elements of the country's historical progress, have all combined to make the task before Mr. Sargent one of considerable magnitude. The teacher who reads this handbook, and at the same time imagines himself giving one of these lectures to his class, will appreciate to the full the difficulties which have been encountered. From this point of view one might wish that Mr. Sargent had substituted the time sequence for that of space; he describes in turn the St. Lawrence, Newfoundland and Labrador, the Maritime Provinces, Quebec, Ontario, the West, and British Columbia, with the result that the historical facts which he includes seem to lack cohesion. But on this question opinions will no doubt differ.

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'Mexico: the Land of Unrest. Being chiefly an account of what produced the outbreak in 1910, together with the story of the revolutions down to this day.' By Henry Baerlein. (London: Herbert and Daniel. 1913. Pp. xxiv., 461. *Maps and Illustrations.*) It is a sordid and sanguinary story that Mr. Baerlein tells in this book, which is almost from first to last a denouncement of the Diaz administration (tersely described by the author as Diazpotism). Mr. Baerlein knows the country well, both by residence and by reading, and supplied information to the *Times* during the event of 1910. His knowledge was gathered mostly in the capital, in the State of Yucatan, and in the Territory of Quintana Roo; with the exception, however, of a chapter devoted to a flying visit to Chilpancingo, the book is not primarily concerned with travel. In a peculiar but attractive style the author describes what he regards as the corrupt and arbitrary government of the late President, the short-lived but well-intentioned Madero *régime*, and the opening of President Huerta's administration. Although chiefly an account of the recent revolutions, the book is sufficiently wide in outlook to constitute a very readable picture of the country in general.

'Voyage en Colombie, 1911–1912.' By F. Serret. (Paris: Dunod et Pinat. 1913. Pp. viii., 332. *Illustration.* 3.50 *fr.*) The author begins by describing his route from Bonaventura to Cali and notes the luxuriant vegetation due to the excessive rainfall of the western coast. On p. 77 is an interesting note on the many uses of the agave, and scattered through the book are numerous references to native customs and methods of travel. There is a good account of the marshy and malarial valley of the Magdalena (p. 209). The book may be

recommended to those who are interested in Colombia and do not object to the style of a diary.

## GENERAL.

### Power Supply.

'Natural Sources of Energy.' By A. H. Gibson. The Cambridge Manuals of Science and Literature. 1913. *Illustrations and Maps.* Pp. 131. 1*s. net.*

Prof. Gibson's summary of the facts regarding the problem underlying the supply of energy for the world is thoroughly practical and at the same time intensely geographical. No geographer can ignore the work of scientists who are applying their knowledge to practical life, and this study of the present position of man in his gradual conquest of the forces of nature and his gradual control of his environment is of prime importance from this point of view. The geographical nature of the problem is exemplified by the world maps with which the book is illustrated, for these maps show the location of the power-supplies which are either actually in use or are available for future generations.

Referring to the regions which are subject to intense solar-heat, the author states, "so long as such stores of energy are available, there is little reason to anticipate any insuperable difficulty in maintaining the industrial activity of the world as a whole. To our own and all northern communities, however, they can offer but little assistance even with all the help electric transmission can give, and their utilization on any large scale would involve an immense change in the relative industrial importance of the countries of the world."

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'Preliminary Geography.' By E. G. Hodgkinson. (London: W. B. Clive. 1913. Pp. 225. *Maps and Diagrams.* 1*s.* 6*d.*) Mr. Hodgkinson "is convinced that without a solid foundation laid at an early age the later work cannot be attractive and thorough." The age for which he provides this solid foundation is between 11 and 13 or 14 years. The book opens with a discussion of geographical principles, latitude and longitude, land forms, the sea, climate and weather, land divisions, and natural productions, etc., and in this section the teacher is provided with suggestive diagrams; later, the continents, and, finally, the British Isles receive attention. The foundation which is laid for the later development of the geography of Asia consists largely of topographical information which the pupils could and should obtain for themselves by the use of an atlas. B. C. W.

'Questions and Exercises in Geography.' By R. J. Finch. (London: Ralph Holland & Co. 1913. 2*s.* 6*d. net.*) A useful collection of questions, many of which have been set in recent examinations. A few typical questions are answered in the introduction. The account of Budapest is specially well done. We are glad to see that the author emphasizes in this answer the value of sketch-maps, which really show the important points. It is unfortunate that on page xii., the Cape to Cairo railway is illustrated by a sketch-map in which the proposed line runs almost due south, to the east of the Nile, from Sennaar to Victoria Nyanza, while the description refers to the Sudan railway to El Obeid on the west of the Nile. In the south the proposed line is placed on the sketch-map to the east of the Rhodesia-Congo rail running from Broken Hill, apparently through the swamps of Lake Bangweolo, to the south of Lake Tanganyika. Nothing is said of the physical conditions on these routes, which have apparently been abandoned on account of their disadvantages.

'A Comparative Geography of the Six Continents.' By Ellis W. Heaton. (London: Ralph Holland & Co. 1913. 1*s.* 9*d. net.*) Mr. Heaton makes many

useful comparisons between the continents in his book. Some of the diagrams are specially suggestive. Figs. 12 and 13 illustrate well the deflection of isotherms caused by warm currents; Fig. 34 shows the contrast in temperature and rainfall between the west of Norway and Sweden; Fig. 60 the out-going trade of the Baltic; and Fig. 61 the ports of the Atlantic margin.

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## THE MONTHLY RECORD.

### EUROPE.

**Fixation of Shingle by Vegetation on the English Coasts.**—An elaborate study of the growth of a maritime plant of the order *Chenopodiaceæ*—*Suæda fruticosa*, or sea-blite—principally at Blakeney point, Norfolk, and on the Chesil bank, is contributed to the *Journal of Ecology* (vol. 1, No. 4) by F. W. Oliver and E. J. Salisbury, with a view to gauging the possibilities of shore protection by artificial planting. It is, of course, impossible for vegetation of the kind to establish itself on the sea margin of a shingle bank exposed to the scour of along-shore currents, and it is only the inner side of such banks, facing the salt-marsh, estuary, or lagoon, which separates them from the firm land, which offer possibilities of the kind under consideration. The shrub in question forms in time a matted growth reaching a maximum height of 3 or 4 feet. The establishment of *Suæda* at any spot seems to need the coincidence of two factors, viz. (1) facilities for the introduction of seed to the lee fringe of the bank; and (2) sufficient stability for the establishment of seedlings. The seed is produced in abundance, and is brought to the inner edge of the bank with the tidal drift from the marshes. At Blakeney point three zones of growth at different elevations are traceable, but it is the lowest which is the zone of the first establishment. It is only at exceptionally high tides combined with on-shore winds that shingle is carried over the top of the bank in sufficient quantity to destroy the growth, and the zones are thought to represent successive periods of stability. The *Suæda* responds to burying by shingle in such a way that the fringe of plants originally established at the water's edge may, with the advance of the shingle bank, eventually reach its crest. Bent down by the flow of shingle, the plants lose their erect habit, sending up new lateral shoots from their prostrate stems, and acquiring the matted growth above alluded to. The lines of plants are broken here and there by gaps through which the flow of shingle is principally concentrated, the profile of the bank where the bushes occur showing the influence they exercise as shingle-obstructors. On the Chesil bank the growth is limited to the lowest zone, and this is attributed to a deficiency of tidal drift. It is thought that, given suitable conditions, *Suæda* would be pre-eminently adapted for planting on shingle spits and similar formations where the object is to arrest the landward travel.

**Canals and other Means of Transport in Russia.**—In the *Deutsche Geogr. Blätter*, vol. **36**, part 3–4, Dr. R. Hennig takes stock of the present position of the Russian system of canals and of the various schemes for further development of internal navigation in that country. Although the conditions for this purpose may be described as ideal, they have so far been little utilized, for though almost all the important rivers of Russia are connected by canals, these are of small size and for the most part navigable by rafts only. Still, even under existing circumstances, the Baltic and Caspian, the White sea and Caspian, and the Baltic and Black sea are connected respectively by canals, though even the most important

of these are navigable by small vessels only. Much has been urged in favour of modernizing the whole system of inland navigation, which has suffered from neglect and the competition of the railways. The most important scheme is of course that for a canal between the waters of the Baltic and Black sea, which would provide not only the Baltic provinces of Russia, but a large part of Northern and Central Europe besides, with a valuable means of access to Southern Russia and the Black sea ports. This scheme has found considerable support within the last few years, and preliminary works have already been taken in hand, though the idea of a channel navigable by sea-going ships has been abandoned on the score of expense. Details are given of the works to be carried out, which include: (1) The improvement of the Dwina between Riga and Vitebsk (593 kilometres), by the construction of thirty-nine locks and weirs, the difference in level being 123½ metres. (2) The making of a canal of 92 kilometres between Vitebsk and Orsha, following the line of the small rivers Luchesa and Orshitza. This will need eleven locks, and two small lakes on the divide will be converted into reservoirs. (3) The improvement of the Dniepr down to Kherson (1810 kilometres) by the construction of twenty-three locks and other works, together with the making of two canals in the section of rapids between Ekaterinoslav and Alexandrovsk. Of a total difference of level of 153 metres, thirty-one fall within this section. Other schemes that have been talked of of late, but without yet coming near realization, are the old idea of a canal to connect the Black sea with the Caspian, and the connection of the Baltic with the White sea. For the former the line running roughly from Astrakhan to Taganrog has lately found most favour. In the same number of the *Blätter*, Mr. A. Sibiriakoff discusses (1) the improvement of communication across the Northern Urals by the making of roads between branches of the Ob and Pechora; (2) the junction of the Angara (upper Yenisei) and the Lena by a railway from Tulun to Ust-Kut, and the extension of steam navigation on those rivers.

## ASIA.

**Mr. Kingdon Ward on the Yunnan-Tibet Border.**—We have received from Mr. F. Kingdon Ward, whose previous journeys have been referred to in the *Journal* (vol. **39**, p. 582; **42**, p. 461), a short account of an attempt lately made by him to penetrate south-eastern Tibet from Yunnan. Unfortunately, the political position on the frontier placed unusual difficulties in the way of an advance, and Mr. Ward returned to his base at A-tun-tse without accomplishing his design, though during a journey of ninety-two days he was able to see something of the imperfectly known tribes on this frontier, and to make some botanical and geological observations. He left A-tun-tse on October 30, and, crossing into Tsa-rung *viâ* Pei-tu, traversed that province almost to Menkong in the Salwin valley (visited both by Bailey and Bacot). Here the Chinese official vetoed an advance to the Irawadi valley, so Mr. Ward hastened for three days down the Salwin valley, and on November 22 started with Lisu porters for To-ma-lu. But being overtaken by torrential rain, his porters were frightened by the snow on the passes, and refused to proceed across the mountains. The Chinese again proved obstructive, but the party moved slowly down the valley in constant rain and snow, which blocked the passes on both sides. Mr. Ward got fever, and as the country produced little food, he was compelled, after making his way to Latsa, to turn back north. On reaching Chamutong on December 22 he was practically made a prisoner on parole, but was allowed to go north to Tsa-rung. Being hustled out of Pei-tu (the Chinese having now gained a footing in Tsa-rung), he reached A-tun-tse on January 29, having experienced glorious weather in Tsa-rung.

During the journey he had kept a compass-traverse of the route, with latitudes by Polaris and meridian distances from A-tun-tse by east and west stars. Besides the Lisu and Lutzu, he came across some of the Kiutzu of the lower Kiu-kiang, as well as of the Kiutzu dwarf race from near the source of that river. Mr. Ward hopes to make another attempt to explore the unknown country to the north-west, but has meanwhile returned to Rangoon.

**Ptolemy's Geography of South-Eastern Asia.**—One of the most successful attempts to explain the geographical notions on Eastern Asia put forward by Ptolemy in his geography is that lately made by Dr. Albert Herrmann in the *Zeitschrift* of the Berlin Geographical Society, 1913, No. 10. The subject was dealt with by the late Col. Gerini in his voluminous work brought out in 1909, but though willingly acknowledging the value of the information collected by this writer, Dr. Hermann agrees with other critics in doubting many of his conclusions. As is well known, Ptolemy's picture of the geography of Eastern Asia was distorted by his belief that the eastern coast-line of the "Magnus Sinus" (beyond the Malay peninsula) was continued southward to far beyond the equator, where (in about 8° S.) he placed Cattigara—the terminus of the sea-route to the land of the Sinae. The opinions of commentators as to the position to be assigned to Cattigara have differed so much that, while some have placed it no further east than Singapore, others have identified it with Hangchou in China. Dr. Herrmann thinks that sufficient attention has not been paid to the fact that in reducing the extension in both latitude and longitude of the map of his predecessor Marinus—his chief source for Far Eastern geography—Ptolemy concentrated the greater part of the reduction in this very region. A reconstruction of the map of Marinus must be attempted with the help of Ptolemy's data. An ocean route between Ceylon and Java was almost certainly in use at this time, just as the Arabian sea was crossed between Arabia and India with the help of the monsoon. Another sea-route across the Bay of Bengal shortened the voyage to the mouth of the Ganges. For the route to the Chinese port of Cattigara, Marinus's (and therefore also Ptolemy's) principal authority was the experienced sea captain, Alexander by name, whose account must have supplied the accurate information regarding the voyage from the mouth of the Irawadi round the coasts of the Malay peninsula. But both west and east of this section (in the "Sinus Gangeticus," and the "Magnus Sinus") the distances as given by Marinus seem proportionally far too great, and Dr. Herrmann concludes that for these other, probably Indian, sources are followed. He thinks, in fact—and the idea seems decidedly plausible—that the delineation of the "Magnus Sinus" is an interpolation in the route of Alexander, in whose Perimulic gulf we have already had one version of the Gulf of Siam. The mistake seems to have arisen from the failure to understand that on reaching the "Magnum promontorium" (the southern point of Cochin China) the route followed, and not merely the coast-line, changed from a south-east to a northerly direction. By continuing the route in a south-easterly direction across the opening of the Magnus Sinus, Ptolemy necessarily brings down the coast of Annam (when reached, as supposed, at the Satyrorum promontorium) into far too low a latitude, and the error increases down to Cattigara. This Dr. Herrmann places on the northern borders of Annam, just where Richthofen and Hirth, on the authority of the Chinese annals, have placed the southern limit of the Chinese Empire at the time. On the assumption that the Magnus Sinus represents a magnified reduplication of the Perimulic gulf, we should expect to find a repetition on it of the place-names occurring on the latter, and this, Dr. Herrmann shows, is actually the case. In the Indian source for the coasts of the Magnus Sinus we probably have an indication of a *land-route* crossing the isthmus of Krah,

by which the long and perilous voyage round the Malay peninsula would be avoided.

## AFRICA.

**Anthropological Survey of British African Possessions.**—In an influentially-signed memorial to the Secretary of State for the Colonies (the list of signatures being headed by that of Earl Curzon as President of this Society), the great importance is pointed out of undertaking without delay an anthropological survey of the British Possessions in Central and East Africa, particularly the Uganda and British East Africa Protectorates. It is urged that as these regions include a number of tribes in various stages of barbarism which have as yet come little under British influence, a full record of the institutions, laws, customs and beliefs of these tribes should be obtained as soon as possible. Such a record would facilitate immensely the task of government by removing causes of friction and discontent arising out of the ignorance of native beliefs and customs on the part of Government officials. If governed by men well acquainted with tribal usages, the tribes would live contented, and the need of those punitive expeditions and petty wars which so frequently occur would be done away with. From a scientific point of view a competent Government anthropologist would be able to make priceless contributions, by throwing light on such subjects as the evolution of marriage and the family, and the like, which must be studied without delay in view of the steady encroachment of European culture. The memorialists recommend for the post the Rev. John Roscoe, M.A., for twenty-five years a missionary in Central Africa, and author of a monumental work on the Baganda published in 1911 (see *Journal*, vol. 39, p. 146) as well as many other anthropological memoirs.

**Protection of Ruins in Rhodesia.**—We are pleased to learn that Mr. R. N. Hall, to whose industry and perseverance the discovery and description of so many of the remains of former days still existing in Rhodesia has been due, has been appointed "Government Curator of the Ancient Monuments of Rhodesia." The objects under his charge will include not only ruins, but all relics wherever found, and also the Bushman paintings, all of which are to be protected from vandalism and preventible destruction. Mr. Hall's headquarters will be at Great Zimbabwe, but four months in each year will, he hopes, be available for the examination or discovery of other remains. Mr. Hall is engaged in completing for press two new volumes, one on the Bushman paintings of Rhodesia, the other on 'The Karanga of 1485 and of to-day.'

**Botanical Survey in Natal.**—The 'Annals of the Natal Museum,' vol. 2, Part 4, 1913, contain a Paper by Dr. J. W. Bews on an œcological survey of the midlands of Natal, especially the district of Pietermaritzburg. The country rises steeply from the sea to the Drakensberg in a series of terraces, which have been cut through by the main river valleys, so that in each terrace there is a higher portion—the high veld region, and a lower portion—the low veld region. The high veld has a greater rainfall, and smaller extremes of temperature than the low veld, whilst the soil, though better aerated, is poorer, the soluble salts being dissolved out and re-deposited below. The soil is itself washed down, and during the dry season blown down, to lower levels, whilst after the frequent grass fires the ashes are also blown down to enrich the soil. The human element is also a considerable factor in determining the distribution of vegetation in the country. Dr. Bews recognizes seven distinct plant formations in this area as determined by the above factors, viz. the Veld, Bush, Thorn Veld, Rocky Hillside, Alpine, Vlei, and Streams and Rivers formations. The thorn veld formation,

which occurs in the low veld region, is characterized by isolated trees which are prevented from growing closer together by the constantly recurring grass fires. The chief features of these trees are an umbrella-form, horizontal root system, variable thorn development, and thick bark, all of which are adaptations brought about by their exposure to the hot winds, by the hard, dry, shaly soil, and perhaps also by the annual grass fires. On the Zwaartkop mountain, nearly 5000 feet high, there is a distinct character of vegetation, and certain species connect it with the alpine formation of the Drakensberg. Of the plantations, as distinguished from the seven natural plant formations enumerated above, the black wattle (*Acacia mollissima*) is the most important. The culture of this tree, which was first introduced into Natal from Australia, probably for ornamental purposes, is now an important industry. The bark is very rich in tannin. The proper habitat of this species is the high veld region, since it requires abundant moisture, and a deep porous soil. It grows best in the "mist belts," especially where the soil is deep, with abundance of iron but scarcity of lime. Such soils, though very poor chemically, are good mechanically, as already mentioned, and are never entirely dry like the much richer soils of the "mealie country" in the low veld. Dr. Bews produces excellent photographs to illustrate the different plant formations, and incidentally Natal landscapes. He is somewhat too emphatic, we think, upon the question of influence of forest destruction in decreasing the rainfall.

## AUSTRALASIA AND PACIFIC ISLANDS.

**The Loss of La Pérouse.**—Mr. C. M. Woodford, British Resident in the Solomon islands, sends us a short account of a visit paid by him in 1912 to Vanikoro, the site of the disaster to La Pérouse's expedition in 1788, as elucidated many years later by the English captain Peter Dillon and the French navigator Dumont D'Urville. Reaching the village of Peu, on the south-east coast of the island, off which the French ships were lost and where Dillon recovered most of the relics secured by him, Mr. Woodford was shown the site of the camp where some of the survivors lived for many years. This was on the western bank of the small river which enters the sea at Peu, close to its mouth, and was entirely overgrown with vegetation, though the natives were confident in pointing out the position of the camp. From them he obtained a small spherical bullet and some pieces of lead which they assured him had been found (as such things still are occasionally) on the site of the camp. They have been obligingly presented to the Society by Mr. Woodford, together with a portion of a sheet of copper (the whole measuring four feet by two) which he was told had been picked up on the reef where the ships were lost. It is of *pure* copper, and, under the mark of an arrow-head, shows the letters "B O," which Mr. Woodford interprets as "Board of Ordnance." Although La Pérouse refitted at Botany Bay in 1787 with the assistance of the British authorities, the copper seems in too good preservation to have belonged to either of his ships, and it is doubtful whether such copper was in use at the time. As Mr. Woodford remarks, several British men-of-war visited Vanikoro during the nineteenth century. There was very little trace of the "mausoleum" erected by Dumont D'Urville on a coral patch in Manevai bay, except a small cairn of stones in the centre of a clump of mangroves.

**The Fate of the "Santa Ysabel", of Alvaro de Mendaña's Squadron.**—A letter has recently been communicated to the Society in which Mr. Lawrence Hargrave, of Sydney, N.S.W., claims to have verified the fate of Alvaro de Mendaña's consort the *Santa Ysabel*, which disappeared from the rest of that commander's squadron, in the year 1595, during a murky night among the islands of the Santa Cruz and Swallow groups, in lat. 10° 15′ S., long. 166° E. Mr.

Hargrave submits a modern chart of Torres straits, whereon he has laid down a portion of the track he supposes the *Santa Ysabel* to have followed, and the position where he believes she eventually sank. He endeavours to identify the reputed native names of certain islets and cays in that situation, as recorded on the Admiralty charts, with the Spanish words *mar veja*, *harrenar*, and *hogar*, etc., meaning respectively "troublous sea," "to scuttle," and "fire-hearth," etc. It is further asserted that evidences of the sojourn and movements of some ship, apparently Spanish, exist at various points within the Queensland barrier reef; and even so far to the southward as Sydney and the Shoalhaven river in New South Wales. Some of these indications have been reported before, but it is now sought to prove that at least a portion of them afford traces of the particular *Santa Ysabel* of Mendaña's fleet. Among these signs are mentioned rock-drawings, Aztec picture-writing, the date 1600 carved on a rock, and sundry Spanish relics at Port Curtis and elsewhere. Mr. Hargrave describes the statements conveyed in his letter as "extracts"; but we are as yet without clue to the documents or other sources from which they are culled, and it would be premature in the circumstances to discuss the merits of his deductions without more exact authority and corroboration, which it may be hoped will presently be forthcoming.

## MATHEMATICAL AND PHYSICAL GEOGRAPHY.

**Floating Islands.**—In the January number (1914) of the *Bulletin of the Geographical Society of Philadelphia*, Mr. Sidney Powers discusses the phenomena of floating islands, both permanent and periodic, classifying them according to their presumed mode of origin, and describing in some detail important cases in different parts of the world. He defines such islands as masses of vegetable matter which float upon the surface of water. They may or may not be attached to the bottom, but rise and fall with the water-level. The first to notice their existence was Herodotus over two thousand years ago, and later Pliny the elder devoted a chapter of the celebrated 'Natural History' to "floating and swimming islands." Upon the narrow definition given above, that is to say, excluding such objects as floating ice, wood, etc., Mr. Powers considers that such islands may be formed (1) by ice action; (2) by wave action; (3) by the union of floating vegetable material; (4) by the rise of the water-level by either natural or artificial means. They may occur in both lakes and rivers or even the sea; and the condition required for the above-mentioned agencies to operate seems to be a shelf of vegetation projecting outwards from the shore. Thus, when the water-level in a lake is raised either by freshets or the construction of a dam, pieces of this shelf vegetation may become detached, and float about, usually covered with spongy sphagnum moss. In the lakes of the New England States floating islands are very common; they are, moreover, large, and frequently of a solid enough consistency to support shrubs and conifers. Where living vegetation forms part of a tangled mass of roots and branches it will grow, and help to make the mass more compact. On the coast of Denmark large masses of sphagnum moss brought together by the waves become thick enough to support the weight of a man. Of periodic islands the most important example discussed by Mr. Powers is the mysterious object in Derwentwater which rises a little above the surface of the lake at irregular intervals, but only in hot dry seasons between June and October. The information given is based upon the authority of residents in Borrowdale, upon the bathymetric investigations of Dr. Mill in 1893, and particularly, perhaps, upon Mr. C. J. Symons' book entitled 'The Floating Island in Derwentwater,' which was published in 1888. This much may be said to be known about the

island, that whatever its origin may have been prior to 1773, its periodic rise is due to the inflation of vegetable matter by marsh gas generated through bacterial agency when the temperature of the lake exceeds 60° F. It does not, however, always rise to the surface when the temperature exceeds 60°, and when it does appear its dimensions vary greatly, which is only in keeping with its otherwise erratic behaviour. Beneath the island is a layer of diatomaceous earth, from the top of which it separates on rising and with which it must evidently be connected in some way. Mr. Powers gives a list of the years for which definite information, positive or negative, is available concerning this physical apparition. We find nothing noted for 1904, but the present writer remembers during a two months' sojourn in Cumberland in the late summer noticing a somewhat reedy appearance over the site now and again, betraying its location.

**Recent Crinoids as a Guide to the Abyssal Circulation of the Oceans.**—Mr. Austin H. Clark, who in 1908 contributed to the *Journal* (vol. 32, p. 602) a paper on "The Recent Crinoids and their Relation to Sea and Land," has lately taken up the study of the distribution of such crinoids—geographical and bathymetrical—as an aid to a knowledge of the circulation of the abyssal waters of the oceans (*Bull. Inst. Oceanogr.*, Monaco, No. 285, Févr. 25, 1914). The results put forward are striking, though some will no doubt hesitate to accept them on the evidence so far available. The range of the genus *Florometra* in the Pacific ocean, from the Magellan strait region to the coasts of Japan, is used as the special argument for the conclusions deduced, though evidence from the distribution of other organisms is held to support those conclusions. Species of *Florometra* have been collected from ninety-eight localities on the shores of the Pacific, the range being apparently continuous from the Magellanic region round the whole western coasts of America and past the Aleutian chain to Japan, with the sole exception of the stretch occupied by the Kurils. Studying the bathymetric and thermal range at the principal localities, Mr. Clark finds a progressive increase in both of these as we advance north, west, and south, coupled with a marked deviation from the average type of the genus. He therefore concludes that the genus originated in the Magellanic region, subsequently extending north, west, and south from that locality. And as these stalked crinoids are typical bottom-living organisms, they cannot be dispersed by surface currents, and it seems necessary to suppose that a continuous deep current originally supplied by Antarctic water flows round the whole margin of the Pacific, starting up the coast of South America as the Humboldt current. In this view he reverts to the earlier ideas regarding the supposed cold currents running up the western sides of the southern continents, the tendency of late years having been to maintain that the cold water is merely abyssal water welling up at certain parts of the coasts. Thus, he thinks that the cold water on the north-west coast of Africa is really continuous with the so-called Benguela current much further south. He regards as small-scale examples of the general circulation of the deep waters of the Pacific the phenomena to be observed in the seas of Japan and Okhotsk, for, though the water is there warm, it is of high specific gravity and therefore behaves in a way analogous to the cold water supposed to make the circuit of the Pacific shores. Owing to the force exercised by the Earth's rotation, Mr. Clark points out that south of the equator the northward-flowing water will tend to send out divergent branches to the left, and that the abyssal waters of the South Pacific will thus be fed by Antarctic water, not directly, but through the intermediary of the Humboldt current. In the north the tendency will be for the water to be forced against the coast, and the abysses of the North Pacific will therefore be more stagnant. A general conclusion is that the water of the Antarctic regions

is entirely abyssal water, derived from the abysses of the great oceans, and that the circumpolar Antarctic currents belong to the abyssal circulation, and are in no way related to the surface currents of more northern latitudes. The necessity for this hard and fast distinction is not altogether apparent, and on several points the author's reasoning is not entirely convincing. Thus, if so much of the Antarctic water is diverted into the abysses of the South Pacific, one is inclined to ask how the circulation of this same water is maintained round the whole northern half of the basin.

## POLAR REGIONS.

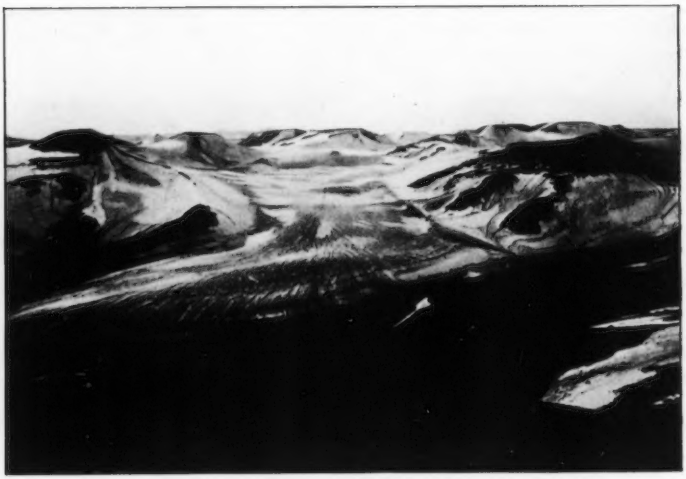
**Exploration in Spitsbergen.**—Spitsbergen has become such a favourite field for small explorations, no doubt owing to its conveniently short distance from Europe, that in spite of the climatic and other difficulties in the way of actual work, we may expect its whole surface to be known before many years have passed. One of the modest expeditions which has helped to fill up a previously existing blank was carried out in 1913, with the support of the Prince of Monaco, by Mr. Hermann Stoll, who has favoured us with a short account of his doings. Unable, on account of the ice, to reach his proposed base on one of the northern ramifications of Ice fiord, he turned his attention to the more southern area between Advent bay, the head of Van Mijens bay, and Agardh bay, on the western side of the Stor fiord. He proceeded by sea with two colleagues to Braganza bay at the extreme head of Van Mijens bay (from which it is almost separated by an enormous moraine), where a base-camp was formed. Hence the party set out with supplies for eight days up a wide valley (Kjellström valley of De Geer), which, like an enormous trench, forms a continuation of Van Mijens bay towards the north-east, much as the Sassen valley runs up from Sassen bay. It is bordered by regular mountains some 3000 feet in height, furrowed by eroded ravines, parallel and often equidistant. The valley bottom forms a mossy tundra on which many traces of reindeer were seen. On its left flank several glaciers descend from an ice-sheet to the south-east. The valley bent more and more to the north, and at its head was a great glacier whose foot was at an altitude of only 80 metres. To the east a col of only 300 metres was found, leading across the divide between Van Mijen's bay and Agardh bay. Descending a new large valley running east, with no trace of snow, the travellers obtained a view of the Ivory Gate of Sir Martin Conway, with the ice-sheet that feeds it and the whole snowy chain of Mount Agardh. Having traversed the swampy valley almost to the sea, and made a reconnaissance in the mountains towards Advent valley, during which a fine view was obtained of the whole of the Stor fiord, with Edge and Barents lands in the distance, the travellers returned to the Kjellström valley. Climbing a peak standing out from the ice-cap of Southern Spitsbergen, they had before them an immense panorama of glaciers and bristling peaks. It was ascertained, however, that the area not continuously glaciated, but broken up by open and comparatively verdant valleys into a series of separate massifs, extends farther south than has been supposed in this region.

## GENERAL.

**Summer Courses in Geography.**—A summer school in geography has been arranged to take place at the University College of Wales, Aberystwyth, between August 4 and 22, 1914. Five different courses of lectures will be given, the subjects being respectively: (1) A regional survey of Europe; (2) England and Wales; (3) the teaching of geography by modern methods; (4) the climate of the British isles; (5) mathematical geography and elements of cartography.

GROUP OF PEAKS SOUTH OF THE COL, LOOKING EAST. MOUNT AGARDH RANGE IN THE DISTANCE.

THE PLATEAU BETWEEN AGARDH BAY AND ADVENT VALLEY, SPITSBERGEN.



GLACIER AT THE FOOT OF THE KJELLSTRÖM, SPITSBERGEN.

THE UPPER KJELLSTRÖM VALLEY, SOUTHERN SPITSBERGEN.

Attention will also be given to practical work, and there will be field classes and excursions to places of interest in the neighbourhood. The fee for the course is £2, and certificates will be given to students who work satisfactorily. Correspondence is to be addressed to Prof. Fleure, U.C.W., Aberystwyth. A somewhat similar programme is announced by the Yorkshire Summer School of Geography, which will meet at Whitby, August 3 to 22. This school was instituted in 1913 by the Universities of Leeds and Sheffield in co-operation with Armstrong College, Newcastle-on-Tyne, and other educational bodies. Its object is to provide theoretical and practical instruction in the methods of geography and to furnish opportunities for the discussion of problems connected with the teaching of geography. The special subject this year will be the British Isles, which will be treated both in a general and in two special courses, the latter being offered as alternatives to the choice of each candidate. The course will consist of lectures, laboratory work, map classes, field work, and demonstrations. Certificates will here too be granted to students who have made an approved attendance at lectures, practical classes, etc. Application for admission to the course (the charge for which is £3) should be addressed to the Secretary, Yorkshire Summer School of Geography, The University, Leeds. The lectures at both courses will be given by competent teachers.

**The Chatham Memorial to Captain Scott and his Companions.**—This memorial, already referred to in the *Journal*, has been erected in the Royal Naval Barracks Church, Chatham, by the Commander-in-Chief, officers, and men, of the Nore Command. It takes the form of a Memorial Brass with suitable inscription, and a quotation from Captain Scott's last message to his countrymen. Inserted in it are also two Antarctic medals of which the grant has been authorized by the Lords Commissioners of the Admiralty. The balance of the Fund collected will be invested by the Committee of the Royal Naval and Marine Orphan Home, The Nore, and the income applied as the Committee deem fit, but preferably as a prize or prizes to girls on leaving the Home.

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## OBITUARY.

### Sir John Murray, K.C.B., F.R.S.

The death of Sir John Murray, which occurred on 16th March last, as a result of a motor-car accident, removes a commanding figure from the ranks of British geographers, and with his death there passes away one of the last of the pioneer investigators who laid the foundations of modern scientific geography during the last quarter of the nineteenth century.

John Murray was the son of a Scotsman who emigrated to Canada. He was born at Coburg, Ontario, in 1841, and to the fact that he spent the first seventeen years of his life in the simple and virile conditions of a new country may perhaps be attributed some part of the unfailing freshness and independence which characterized every aspect of his personality. Coming to Scotland in his seventeenth year, he completed his school education at Stirling High School, and then went to the University of Edinburgh. Here he treated syllabuses, examinations, and degrees alike with a genial indifference; he preferred to explore the domains of the natural sciences and of literature in his own way,

while taking of the best from the group of leaders who conferred so much distinction on the scientific thought of Edinburgh at the time, just as a somewhat similar group had done in other fields two generations earlier. The powers of thinking clearly, of appropriating the essential and rejecting the irrelevant, which were of such signal service in his maturer work, became apparent at this early stage; and with them there developed the desire to apply them to new and unknown conditions, as is shown by his adventurous cruise in a Peterhead whaler in the year 1868. It was little wonder that an opening mind of this type was greatly drawn by the mysteries of the ocean depths, to which attention had been specially attracted by the cruises of the *Lightning* and the *Porcupine* in the Faeroe-Shetland Channel.

Murray, then, was a young naturalist from whom much was expected when the opportunity came, just at the right moment. Wyville Thomson, who had been elected Professor of Natural History in the University of Edinburgh in 1870, was appointed head of the civilian scientific staff of the great expedition which set out to explore the oceans and their depths in H.M.S. *Challenger* in the year 1873, and returned laden with scientific treasure in 1876, and he selected Murray as one of the three chief civilians under him. On the return of the ship the "*Challenger* Expedition Commission" was set up, with its headquarters at 32, Queen street, Edinburgh, to work out results and prepare and publish reports. Wyville Thomson died in 1882, and Murray was appointed to continue the undertaking. The fifty volumes of *Challenger* Reports are of course his great achievement. The outstanding merit of that achievement was well recognized during his lifetime by the honours and distinctions poured upon him from all quarters, but now that he is passed away it is easier to place on record some of the exceptional difficulties which he overcame by the exercise of his special powers. We leave out of account the difficulties of a financial and administrative nature, which were formidable enough in themselves, and would make a leader's name even now when science is somewhat better recognized and understood than it was in the eighties, and we think rather of the scientific problem. Much, indeed most of the material brought home by the *Challenger* was new, and Murray had in many cases to decide whether it was to be dealt with by a scientific man of recognized standing who would "take it on as extra work," whether a junior should be entrusted with material and given the chance of making his reputation with it, or whether the work was to be done under his own eyes by beginners trained for the purpose. The process of selection obviously required much skill and knowledge of men, and the task of driving so mixed a team to reach its destination in reasonable time was one beyond the powers of most. But Murray did it, and in few cases did he fail to acquire and retain not only the respect but the affection of those who had the distinction of contributing to the *Challenger* Reports, and who still regard the "*Challenger* medal"—his gift after the work was completed—as amongst their most valued possessions.

But apart from the direct results of Murray's labours on the *Challenger* Expedition Commission, the fact that he was not only an organizer and administrator but himself a scientific expert, especially on the wider geographical issues (such as those he discussed in the "Summary" volumes) made his influence react strongly upon those associated with him. His exceptional power of making accurate use of data of all kinds for special purposes, even when the data led him far out of his own particular field, made the *Challenger* Office a centre of immense stimulus to such minds as those of Tait, Kelvin, Chrystal, Crum Brown and Buchan, to whom, with others, Murray

was constantly proposing new problems and providing new material. And the younger men, many of them university students under one or other of these masters, know best how Murray widened their outlook, took them beyond the mere requirements of their curricula, and imbued them with the real spirit of research. He was thus in a double sense one of the centres of the scientific life in Edinburgh at the time; he was almost the last survivor of the group from which he learned and of which he afterwards became one; but the succeeding generation will not forget its debt to him.

It is not necessary to speak here of Murray's personal contributions to science; of his work, largely with the Abbé Rénard and with his friend and counsellor Robert Irvine, which established the new science of deep-sea deposits; of his fiercely combated theory of coral atolls; of his survey (in collaboration with Mr. Laurence Pullar) of the Scottish lochs; or of the expedition in the *Michael Sars*, an extraordinary undertaking for a man nearly seventy years of age. All these, and his many other minor investigations, bear the marks of immense resource, rigorous accuracy, and ruthless disregard of mere authority.

It has been said that Sir John Murray was in manner somewhat brusque. He had to suffer many fools, and it is true he did not always suffer them gladly; and some think that there were enterprises he would have nothing to do with which might have profited greatly by the aid of his experience. He hated shams and humbugs of all sorts, and would have none of them; and he believed in discipline of the old Scottish kind. But he never said or did anything inconsistent with the fact that he was one of the kindest and most generous of men, quick to see where encouragement was needed and where a little discouragement would do good, and to remember, when opportunity came, to help those whom he might well have forgotten. His disciples, and they are many, mourn the loss of a great leader.

H. N. Dickson.

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## Fernand Foureau.

By the death of our Gold-medallist, M. Fernand Foureau, which took place in February of this year, France loses an explorer whose work has been crowned with as far-reaching results as those of any among the pioneers to whom her present commanding position in North and West Africa is to be ascribed. Even before his time the view of those interested in Algeria had turned towards the South as destined one day to fall under French influence, and from about 1878 onwards the idea of a railway across the desert to give access to the fertile countries of the Central Sudan began to take shape, though thwarted for a time by the hostility of the redoubted Tuareg, to which the Flatters mission fell a victim in 1881. Still something could be done towards improving the knowledge of the more accessible parts of the desert, and in work for this end M. Foureau found his opportunity. In 1882, after successfully completing minor tasks of the same kind, he was entrusted with a mission into the Sahara, on which he pushed some distance south of Wargla, carrying out route surveys and collecting notes on the country traversed. This was the first of a succession of journeys in which he covered the Algerian Sahara, from Insalah in the west to Ghadames on the east, with a network of routes, fixing a large number of positions astronomically, determining altitudes, and laying the basis of an improved map of the whole of this region. Still the dread of the Tuareg made it impossible to advance very far in the direction of Air, by which the desired route to the Sudan would lead. In 1892 Timassinin had been reached, and

in 1894 the *Tassili*, on the borders of the Azjer country, but two attempts in 1895 to push further proved unavailing, though undertaken with great hopes of success. In the winter of 1895–96 the disturbed state of the Tuareg country obliged Foureau to confine his attention to the sand-dune region towards Ghadames, but in 1897 a new southward journey was undertaken, though it failed from want of adequate resources. At length, in 1898, the traveller's pertinacity reaped its reward in the decision of the authorities to despatch him on a more important expedition than any yet carried out, supported by an armed escort under Major Lamy, by which, it was hoped, the Tuareg would be overawed, and would see that opposition was useless. In spite of many difficulties from the nature of the country, the want of water on a considerable part of the route, and the temporary opposition of the Tuareg, the expedition proved successful in its object; Agadez, the capital of Air, being reached on July 28, 1899, and Zinder, after further difficulties and delays, about the end of October. The journey was then continued to Lake Chad and the Shari, and the return made by way of the Congo in 1900. By this great journey the way was finally opened for the extension of French supremacy across the Central Sahara to the Sudan, and the junction of the spheres of that nation in North, West, and Equatorial Africa.

Besides many contributions to geographical serials, and one or two shorter narratives of earlier journeys in book form, Foureau brought out a detailed popular account of his most important expedition under the title 'D'Alger au Congo par le Tchad' (1901), and he superintended the publication of a large work in three quarto volumes, giving the complete scientific results of the journey, and forming one of the most important authorities in existence on the geography of the Central Sahara and neighbouring regions. In 1902 he was honoured by the Paris Academy of Sciences with the award of the "Prix Lecomte," having already received the Patron's Medal of our Society in 1899. In 1906 he became Governor of the Comoros, and in 1908 of Martinique. He died at the age of sixty-four.

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## CORRESPONDENCE.

### A Hitherto unknown Tribe in German East Africa.

King William's Town, February 20, 1914.

Being the first missionary to the Winamwanga, and having lived among them for a number of years and reduced their language, I was specially interested in reading the paragraph under the above heading in the January *Journal* (vol. 43, p. 82), and thought a few notes relating thereto might not be out of place.

I believe it will be found the people referred to are not the remnant of a tribe, and that they have not been hitherto unknown.

Setting out from my headquarters at Mwenzo, a few miles from Fife on the Tanganyika plateau, I made my first visit to Chindi, which lies near the fort of the Ching'amba range. A few miles further on was Nonda, then the capital of the Winamwanga territory and where the paramount chief resided. That was in August, 1894, and before the boundary separating British from German territory in these parts had been fixed. From then on I was much in contact with the people of Chindi and surrounding country. Most probably other Europeans had visited this place at an earlier date, and certainly others at a

later period, so that the natives referred to can hardly be called hitherto unknown twenty years later.

When going into the history of the Winamwanga (not Wanyamwanga) I found the people were unanimous in saying their chiefs had always been of the Mwanza clan or gens, *i.e.* it was the ruling or royal clan. That their chiefs, along with those of the Mambwe, Alungu, Nyika, Nkonde, and Tambo, all came from the direction of Wiza country at the one time and established themselves as rulers or heads over the above-named tribes. This would seem to imply that some dominant tribe had migrated into these regions, and that the different clans or gens of which it was composed had set themselves up as chiefs over the people among whom they respectively settled. The Mwanza became the chiefs of the Winamwanga, as the Kawona became the chiefs of the Wiwa, *i.e.* the chieftainship ran in these families.

In the early days the Mwanza had neither wealth nor power, but one day a stranger suddenly appeared among the Winamwanga. He carried in the tuft (part left unshaved) on his head some *malezi* (the small millet grain and the chief food of the Winamwanga). He was a smith, and knew how to make rings and bracelets. The tribe was ignorant of this art. This stranger, whom the people called by the name "Musyane," *i.e.* a smith, because of his knowledge and skill, became wealthy and powerful, and the people liked him.

Musyane settled there and married one of the Mwanza clan or family. To them he said, "I shall take the chieftainship and you shall become my parents-in-law." The Mwanza were silent, but all the people said, "Yes, that is so." Then the drums were beat in honour of Musyane. The territory of the Winamwanga was not very large at this time, but Musyane soon extended his borders and became a very powerful chief. We cannot go into the whole history now. Musyane died and was buried at Mwenzo (I have since heard that his remains were removed and reinterred at the present head chief's place, which is in German territory). It seems a pity that the territory of the Winamwanga could not have been kept wholly under British or wholly under German control, instead of, as at present, the country and its people being divided in two.

Mwenzo was for long the capital. The time of Musyane's rule was for the Winamwanga their golden age. The regular sacrifices and offerings were made at his grave outside Mwenzo village. The priest was of the Mwanza clan. To-day, many of the same name reside on the plateau and form part not only of the Winamwanga, but other tribes as well. As a result of tribal wars and other causes the capital of the Winamwanga was changed from one place to another. At the time of my visit to Chikanamuliso (the head chief) in 1894 it was Nonda, on the river Kana, which flows through the Konde plain into the Raisi.

Re the word Wasimwanza, it is not the name of a tribe, but of a clan or gens, corresponding to the old Greek Phratria, or brotherhood. (Wasimwanza = the clan or gens called Mwanza (more particularly the males). Wa = plural prefix. Si = male members—as Na = female members—of the clan. Mwanza = family name. Hence the word in full simply means the people whose family name is Mwanza.)

It is as if a traveller were to visit the Highlands of Scotland, and coming into the district, say, of the Campbells, he were to ask them, "Who are you? What people are you?" And they would most likely reply, "We are Campbells." This would not mean he had come upon a new tribe or nation, simply because they had called themselves Campbell (their family or clan name) instead of Scotch, their tribal (so to speak) or natural name.

It is very natural there should be many of the Mwanza clan living at Chindi,

seeing it is in near neighbourhood of the head chief's place. But they are to be found all over the Winamwanga country and also among other tribes on the Tanganyika plateau.

Each tribe (as we understand that term), instead of being composed of only one clan or gens, is made up of many—the same family names being found among various tribes.

I feel, however, I have written at too great length on a subject that is perhaps of little moment, but the fact that Mr. Kirschstein had come upon some of the Mwanza and considered them the remnant of a hitherto unknown tribe and the prominence given to it in the *Journal* led me to believe a few more details might not be altogether uninteresting.

ALEXANDER DEWAR.

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## MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY, SESSION 1913–1914.

*Eleventh Meeting, March* 23, 1914.—DOUGLAS W. FRESHFIELD, Esq., Vice-President, in the Chair.

ELECTIONS.—*Herbert Oswald Barker; Miss Nellie S. Bishop; T. A. Corry; James Edwards; Douglas Edward Finlay, M.B.; Melvin A. Hall; Major Edgar Herapath (late Lincolnshire Regiment); Jonas Lied; Lieut. C. G. Moores (R.E.); W. R. Fiddes Osmond; George Farrer Pugh; Edwin Otho Sachs; Miss Alys G. Sandars.*

The paper read was:—

"Lost Explorers of the Pacific." By Basil Thomson.

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*Twelfth Meeting, April* 6, 1914.—The Right Hon. EARL CURZON OF KEDLESTON, G.C.S.I., G.C.I.E., etc., President, in the Chair.

ELECTIONS.—*Alfredo Arias; Edward G. Campbell Barton; Miss Ruth Broadwood; George Cooke-Adams, C.E., M.D.; George Crofts; Joseph Gordon Gordon, C.E.; Henry Bagshaw Henley; William Hunter; Harry Davies Campbell Jones; Major George Knowles, D.S.O. (2nd Lancers, I.A.); Captain Arthur Mitchell, R.A.; W. R. Price; Mrs. H. M. Rawnsley; Edward James Sewell; William Spear; Alexander Spencer; J. G. Spencer; Charles Spurrell, F.R.C.S.; Rev. Tom Pearman Stevens.*

The paper read was:—

"Some Famous Maps in the British Museum." By J. A. J. de Villiers.

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*Afternoon Meeting, April* 23, 1914.—Dr. AUBREY STRAHAN, F.R.S., in the Chair.

The paper read was:—

"The East African Trough." By John Parkinson.

# GEOGRAPHICAL LITERATURE OF THE MONTH.

## *Additions to the Library.*

By EDWARD HEAWOOD, M.A., *Librarian*, R.G.S.

The following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are as a rule written in full:—

A. = Academy, Academie, Akademie.
Abh. = Abhandlungen.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Col. = Colonies.
Com. = Commerce.
C.R. = Comptes Rendus.
E. = Erdkunde.
G. = Geography, Géographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
Iz. = Izvestiya.
J. = Journal.
Jb. = Jahrbuch.
Jber. = Jahresbericht.
k.k. = kaiserlich und königlich.
M. = Mitteilungen.
Mag. = Magazine.
Mem. (Mém.) = Memoirs, Mémoires.
Met. (mét.) = Meteorological.
P. = Proceedings.
R. = Royal.
Rev. (Riv.) = Review, Revue, Rivista.
S. = Society, Société, Selskab.
Sc. = Science(s).
Sitzb. = Sitzungsbericht.
T. = Transactions.
Ts. = Tijdschrift, Tidskrift.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.
Zap. = Zapiski.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half inch. The size of the *Journal* is $10 \times 6\frac{1}{2}$.

**A selection of the works in this list will be noticed elsewhere in the "Journal."**

### EUROPE.

**Germany—Bavaria.** **Lang.**
*Geol. Charakterbilder (Stille)*, Heft 14 (1913): 6 *Plates, with text.*
Der Nordrand der mittleren Schwäbischen Alb. Von R. Lang. *Illustrations.*

**Germany—Commerce.** *Weltverkehr u. Weltwirtschaft* 3 (1913): 87–92. **Goldberg.**
Die Seeschifffahrt der Kulturnationen. I.: Der Seeverkehr in den deutschen Hafenplätzen. Von Gottfried Goldberg.

**Germany—Geodesy.** *Sitzb. k. A.W. Berlin*, 1913: 550–560. **Helmert.**
Die Bestimmung des Geoids im Gebiete des Harzes. Von F. R. Helmert.

**Germany—Political.** *Petermanns M.* 59 (1913): II. 24. ——
Gebietsaustausch zwischen dem Grossherzogtum Sachsen und dem Herzogtum Sachsen-Meiningen vom 1. Januar 1913. *Map.*
See note in the *Journal*, vol. 42, p. 569.

**Germany—Prussia.** **Thienemann.**
*Rev. Hydrobiologie, Biol. Suppl.* 4 (1912): [No. 3], pp. 127.
Der Bergbach des Sauerlandes. Fauntischbiologische Untersuchungen. Von August Thienemann. *Sketch-maps.*

**Germany—Prussia—Coast.** *Z. Ges. E. Berlin*, 1913: 214–218. **Spethmann.**
Zur deutschen Landeskunde. III.: Fossile Sunde und Strömungsrinnen im Küstengebiet Vorpommerns. Von Hans Spethmann. *Sketch-map.*

**Germany—Prussia—Landslip.** *Petermanns M.* 59 (1913): II. 69–70. **Wegner.**
Der Erdfall bei Hopsten vom 14. April 1913. Vom Prof. Dr. Theodor Wegner. *Sketch-map and Illustrations.*

**Germany—Schleswig-Holstein.** **Fürchtenicht-Boening.**
*Forschungen Deuts. Landes- u. Volksk.* (*Hahn*) 20 (1913): 335–395.
Beiträge zur physikalischen Geographie und Siedlungskunde des Schleswig-Holsteinischen Sandr- (Geest-) Gebietes. Von Dr. Hans Fürchtenicht-Boening. *Map.*

**Germany—Schleswig-Holstein.** **Lehmann.**
*Forschungen Deuts. Landes- u. Volksk.* (*Hahn*), **20** (1913): 301–330.
Hausgeographie von Dithmarschen. Von Prof. Dr. Otto Lehmann. *Map and Illustrations.*

**Germany—Schleswig-Holstein.** **Pessler.**
*Forschungen Deuts. Landes- u. Volksk.* (*Hahn*), **20** (1913): 401–415.
Hausgeographie des Wilster Marsch. Von Dr. W. Pessler. *Map and Illustr.*
A study of the form and distribution of two distinct types of houses in the borderland of Old-Saxon and Frisian influences.

**Germany—Schleswig—Lakes.** *Z. Ges. E. Berlin*, 1913: 624–635. **Wegemann.**
Die Schleswigschen Diluvialseen und ihre Kryptodepressionen. Von Dr. G. Wegemann. *Sketch-maps.*
See note in the April number, p. 439.

**Germany—Towns.** *Petermanns M.* **59** (1913): II. 57–67. **Olbricht.**
Die deutschen Grossstädte. Von Dr. Konrad Olbricht. *Map.*

**Holland—Geology.** **Molengraaf and Van der Gracht.**
Handbuch der regionalen Geologie. Herausgegeben von Prof. Dr. G. Steinmann und Prof. Dr. O. Wilckens. Heidelberg: C. Winter, [1910 ff.]. Size $10\frac{1}{2} \times 7\frac{1}{2}$.
Bd. I. Abt. 3 (1913): Niederlande. Von Dr. G. A. F. Molengraaf und W. A. J. M. van Waterschoot van der Gracht (pp. 98). *Sketch-maps.*

**Hungary—Hydrology.** *M. k.k. G. Ges. Wien* **56** (1913): 586–589. **Czirbusz.**
Das Quelligebiet des Warmen Szamos. Von Prof. Dr. Géza Czirbusz. *Sketch-map.*

**Iceland—Land-forms.** *Petermanns M.* **59** (1913): II. 253–255. **Thoroddsen.**
Polygonboden und "thufur" auf Island. Von Prof. Dr. Th. Thoroddsen.

**Italy—Lipari Islands.** *Ann. Rept. Smithsonian I.* 1912 (1913): 285–289. **Perret.**
Report on the recent great eruption of the volcano "Stromboli." By Frank A. Perret. *Illustrations.*

**Italy—Sardinia.** *Deuts. Rundschau G.* **36** (1913–14): 1–13. **Wagner.**
Die Barbagia in Sardinien. Von Dr. Max Leopold Wagner. *Illustrations.*

**Mediterranean—Historical.** *Petermanns M.* **59** (1913): II. 5–9. **Frank.**
Aviens "Ora maritima" und ihr Wert für das entwicklungsgeschichtliche Studium der Mittelmeerküsten Frankreichs und Spaniens. Von Johannes Frank. *Map.*
Noticed in the Monthly Record (vol. **42**, p. 569).

**Northern Europe—Lake fauna.** *Rev. Hydrobiologie, etc.* **5** (1913): 540–550. **Ekman.**
Studien über die marinen Relikte der nordeuropäischen Binnengewässer. I. Von Dr. Sven Ekman. *Illustrations.*

**North Sea and Baltic.** *Ann. Hydrographie* **41** (1913): 231–246. **Brehmer.**
Ueber die Jahresschwankungen im mittleren Wasserstande der Nordsee und der Ostsee. Von Dr. Brehmer.

**Russia—Commerce.** *Petermanns M.* **59** (1913): II. 194–195. **Woeikof.**
Handel und Industrie im Europäischen Russland. Von Prof. Dr. Alexander Woeikow. *Map.*
Review of a detailed series of reports published in Russian.

**Scandinavia—Geology.** **Högbom.**
Handbuch der regionalen Geologie. Herausgegeben von Prof. Dr. G. Steinmann und Prof. Dr. O. Wilckens. Heidelberg: C. Winter, [1910 *et seq.*]. Size $10\frac{1}{2} \times 7\frac{1}{2}$—
Bd. 4, Abt. 3 (1913): Fennoskandia (Norwegen, Schweden, Finnland). Von A. G. Högbom (pp. 197). *Maps and Sections.*

**Spain—Galicia—Coast.** *Z. Ges. E. Berlin* 1913: 84–114, 198–210. **Scheu.**
Die Rias von Galicien, ihr Werden und Vergehen. Von Erwin Scheu. *Sketch-map and Profiles.*

**Spain—Zamora.** *Deuts. Rundschau G.* **35** (1912–13): 439–446, 481–494. **Halbfass.**
Aus den unbekannten Spanien. (Puebla de Sanabria und der Castañedasee in der Provinz Zamora). Von Prof. Dr. W. Halbfass. *Illustrations.*
Another paper on Lake Castañeda by the same author was noticed in the February number, p. 200.

**Sweden—Lapland—Geology.** **Seydlitz.**
*Geol. Charakterbilder* (*Stille*), *Heft* 13 (1912): 6 *Plates*.
Die kaledonischen Deckengebiets Schwedisch-Lapplands. Von W. von Seydlitz. *Illustrations*.

**Sweden—Precipitation.** *Petermanns M.* 59 (1913): II. 15–16. **Hann**
Die Niederschläge in Schweden. Von Dr. Julius v. Hann.

**Switzerland—Jura.** *M.G. Ges. Hamburg* 27 (1913): 77–118. **Schlee.**
Zur Morphologie des Berner Jura. Von Prof. Dr. P. Schlee. *Maps, Sections, and Illustrations*.

**United Kingdom—Midlands.** **Lapworth.**
The Birmingham country: its geology and physiography. By Charles Lapworth. Birmingham: Cornish Bros., 1913. Size 8½ × 5½, pp. 53. *Maps. Price* 2*s.* 6*d. net. Presented by the Publishers.*

**United Kingdom—Phytogeography.** *Sc. P.R. Dublin S.* 14 (1913): 13–62. **Praeger.**
On the buoyancy of the seeds of some Britannic plants. By R. Lloyd Praeger.
An important subject in relation to the geographical distribution of plants.

**United Kingdom—Scotland.** *Scottish G. Mag.* 29 (1913): 471–479. **Newbigin.**
Geography in Scotland since 1889. A report presented to the Tenth International Geographical Congress at Rome, March–April, 1913. By Dr. Marion J. Newbigin.

**Western Europe—Ethnography.** *Sitzb. k. A.W. Berlin* (1913): 734–765. **Schuchhardt.**
Westeuropa als alter Kulturkreis. Von Carl Schuchhardt. *Illustrations*.

## ASIA.

**India—Historical.** **Law and Martineau.**
Société de l'Histoire des Colonies Françaises. Jean Law de Lauriston. Mémoire sur quelques affaires de l'Empire Mongol, 1756-1761. Publié par Alfred Martineau. Paris: E. Champion, 1913. Size 9½ × 6½, pp. lvi. and 589. *Maps. Price* 18 *fr.*

**India—Kashmir.** **Neve.**
Beyond the Pir Panjal: life and missionary enterprise in Kashmir. (Popular edition.) London: Church Missionary Society, 1914. Size 9 × 6, pp. viii. and 178. *Illustrations. Price* 2*s.* 6*d. Presented by the Publishers.*
The first edition was reviewed in vol. 39, p. 383.

**Japan.** **Terry.**
Terry's Japanese Empire, including Korea and Formosa. With chapters on Manchuria, the Trans-Siberian Railway, and the chief ocean routes to Japan. A guidebook for travellers. By T. Philip Terry. London: Constable & Co., 1914. Size 6½ × 4, pp. cclxxxiii. and 799. *Maps and Plans. Price* 21*s. net. Presented by the Publishers.*

**Turkey—Kurdistan—Language.** **Soane.**
Grammar of the Kurmanji or Kurdish language. By E. B. Soane. London: Luzac & Co., 1913. Size 7½ × 5, pp. xvi. and 289. *Price* 8*s.* 6*d. net. Presented by the Publishers.*

## AFRICA.

**Belgian Congo—Ethnology.** **Weeks.**
Among the primitive Bakongo; a record of thirty years' close intercourse with the Bakongo and other tribes of Equatorial Africa, with a description of their habits, customs, and religious beliefs. By John H. Weeks. London: Seeley, Service & Co., 1914. Size 9 × 5½, pp. 318. *Map and Illustrations. Price* 16*s. net. Presented by the Publishers.*

**British East Africa.** **Dracopoli.**
Through Jubaland to the Lorian Swamp: an adventurous journey of exploration and sport in the unknown African forests and deserts of Jubaland to the unexplored Lorian Swamp. By I. N. Dracopoli. London: Seeley, Service & Co., 1914. Size 9 × 6, pp. 318. *Maps and Illustrations. Price* 16*s. net. Presented by the Publishers.*

**Egypt.** **Reynolds-Ball.**
Cairo of to-day: a practical guide to Cairo and the Nile. By Eustace Reynolds-Ball. 7th edit. London: A. & C. Black, 1914. Size 7 × 4½, pp. iv. and 268. *Maps, Plan, and Illustrations. Price* 2*s.* 6*d. net. Presented by the Publishers.*

**German East Africa.** **Reche.**

Zur Ethnographie des Abflusslosen Gebietes Deutsch-Ostafrikas, auf Grund der Sammlung der Ostafrika-Expedition (Dr. E. Obst) der Geographischen Gesellschaft in Hamburg. Von Dr. Otto Reche. (Abhandlungen des Hamburgischen Kolonialinstituts, Band 17.) Hamburg: L. Friederichsen & Co., 1914. Size 11 × 7½, pp. xii. and 130. *Sketch-map and Illustrations. Price Mk.* 6. *Presented by the Publishers.*

**Nigeria—Folk-lore.** **Tremearne.**

Hausa folk-tales; the Hausa text of the stories in 'Hausa Superstitions and Customs,' and in other publications. By Major A. J. N. Tremearne. London: J. Bale, Sons, & Danielsson, 1914. Size 9 × 5½, pp. xii. and 240. *Price* 12*s.* 6*d. net. Presented by the Publishers.*

**Sahara—Ethnography.** **Bates.**

The Eastern Libyans: an essay. By Oric Bates. London: Macmillan & Co., 1914. Size 13 × 10, pp. xxii. and 298. *Maps and Illustrations. Price* 42*s. net. Presented by the Author.*

**South Africa.** **Tilby.**

The English people overseas. Vol. 6: South Africa, 1486–1913. By A. Wyatt Tilby. London: Constable & Co., 1914. Size 8½ × 5½, pp. x. and 632. *Price* 7*s.* 6*d. net. Presented by the Publishers.*

**Togo—Meteorology.** *M. Deuts. Schutzgeb.* **26** (1913): 211–213. **Weiss.**

Regen- und Meerestemperatur-Messungen im Schutzgebiet Togo, 1912. Von Dr. M. Weiss.

**Tripoli.** **Braun.**

The new Tripoli, and what I saw in the Hinterland. By Ethel Braun. London: T. Fisher Unwin, 1914. Size 9 × 5½, pp. 302. *Illustrations. Price* 10*s.* 6*d. net. Presented by the Publisher.*

**Tunis.** **Van Loo and Blancke.**

La Tunisie moderne et les débouchés qu'elle offre à l'activité belge. Par Rodolphe Van Loo et Alfred C. Blancke. Brussels, 1913. Size 11½ × 8, pp. 46. *Illustrations.*

**Uganda.** *Petermanns M.* **39** (1913): II. 75–77. **Kmunke.**

Meine Forschungsreise durch Uganda. Von Rudolf Kmunke. *Maps and Illustrations.*

**Uganda—Cotton.** *B. Imperial I.* **11** (1913): 381–401. ——

The cotton industry of Uganda.

**West Africa—Geology.** **Lemoine and Parkinson.**

Handbuch der regionalen Geologie. Herausgegeben von Prof. Dr. G. Steinmann und Prof. Dr. O. Wilckens. Heidelberg: C. Winter, [1910 ff.]. Size 10½ × 7½—
Bd. 7, Abt. 6 A. (1913). Afrique Occidentale. Par Dr. Paul Lemoine. English colonies on west coast of Africa and Liberia. By John Parkinson. Pp. 88. *Maps.*

## NORTH AMERICA.

**Mexico.** **Fyfe.**

The real Mexico: a study on the spot. By H. Hamilton Fyfe. London: W. Heinemann, 1914. Size 8 × 5, pp. viii. and 247. *Map. Price* 6*s. net. Presented by the Publisher.*

**Mexico—Historical.** **Cervantes de Salazar.**

Crónica de la Nueva España, que escribió el Dr. Francisco Cervantes de Salazar. Madrid: The Hispanic Society of America, 1914. Size 10½ × 7½, pp. xxiv. and 843. *Presented by the Hispanic Society of America.*

**United States—Historical.** **Newton.**

The colonising activities of the English Puritans: the last phase of the Elizabethan struggle with Spain. By Arthur Percival Newton. New Haven (London: Oxford University Press), 1914. Size 9 × 6, pp. xi. and 344. *Sketch-maps. Price* 10*s.* 6*d. net. Presented by the Publishers.*

**United States—Mississippi—Phytogeography.** **Harper.**

A botanical cross-section of Northern Mississippi, with notes on the influence of soil on vegetation. By Roland M. Harper. (From the *Bulletin* of the Torrey

Botanical Club, Vol. 40, No. 8, August, 1913). N.P., 1913. Size 9 × 6, pp. 377–399. *Illustrations.*

**United States—Ohio-Michigan boundary.** *J.G.* 12 (1913): 5–8. **Eirich.**

A study in historico-geography. The establishing of the Ohio-Michigan boundary line. By Constance Grace Eirich.

Traces the influence of the geographical factors.

**United States—Rainfall.** *T.A. Sc. St. Louis* 21 (1912): 71–78. **Lindsay.**

The annual rainfall and temperature of the United States. By Geo. A. Lindsay. *Diagram.*

**United States—Utah—Geology.** *J. Geology* 21 (1913): 436–452. **Loughlin.**

Reconnaissance in the Southern Wasatch Mountains, Utah. By G. F. Loughlin. *Sketch-maps and Section.*

**United States—Wisconsin.** *Wisconsin Geol. Surv. B.* No. 26 (1913): pp. 94. **Whitbeck.**

The geography and industries of Wisconsin. By Ray Hughes Whitbeck. *Sketch-maps, Diagrams, and Illustrations.*

## CENTRAL AND SOUTH AMERICA.

**Ecuador.** **Enock.**

Ecuador: its ancient and modern history, topography, and natural resources, industries, and social development. By C. Reginald Enock. London: T. Fisher Unwin, 1914. Size 9 × 6, pp. 375. *Maps and Illustrations. Price* 10*s.* 6*d. net. Presented by the Publisher.*

**Guatemala—Civilization.** **Huntington.**

*P. Amer. Philos. S. Philadelphia* 52 (1913): 467–487.

Guatemala and the highest native American civilization. By Ellsworth Huntington.

**Panama Canal.** **Haskin.**

The Panama Canal. By Frederic J. Haskin. London: W. Heinemann, 1914. Size 8½ × 5½, pp. x. and 386. *Illustrations and Diagrams. Price* 6*s. net. Presented by the Publisher.*

**Panama Canal.** *Weltverkehr u. Weltwirtschaft* 3 (1913): 241–245. **Hennig.**

Die Frage der Gefährdung des Panamakanals durch geologische Ereignisse, insbesondere Erdbeben. Von Dr. Edwin Hennig.

**Patagonia—Water-parting.** *Z. Gletscherkunde* 7 (1913): 260–265. **Hauthal.**

Die Interozeanische Wasserscheide in Patagonien. Von R. Hauthal.

**Peru—Coropuna.** **Peck.**

A race for a mountain top. The first ascent of stately Coropuna. By Annie S. Peck. (From the *Illustrated Outdoor World and Recreation*, vols. 48, Nos. 1 and 2, 1912–13.) New York, 1912–13, pp. [10]. *Illustrations.*

**Peru—Lima.** **Cisneros.**

Carlos B. Cisneros. Guia mignon de Lima. Lima: Tip. "Union," [1913]. Size 6 × 4, pp. [150]. *Plan and Illustrations. Presented by the Author.*

**Peru—Lima.** **Cisneros.**

Carlos B. Cisneros. Provincia de Lima (monografia del Departamento de Lima). [Lima], 1911. Size 10 × 7, pp. 294. *Map, Plan, and Illustrations.*

**Peru—Petroleum.** *An. S. Científica Argentina* 73 (1912): 120–154. **Jiménez.**

La industria del petróleo en el Perú. Por Juan Velásquez Jiménez.

**South America.** **Chamberlain.**

The Continents and their people. South America: a supplementary geography. By J. F. Chamberlain and A. H. Chamberlain. New York (London: Macmillan & Co.), 1913. Size 7½ × 5, pp. ix. and 189. *Sketch-maps and Illustrations. Price* 3*s. Presented by the Publishers.*

**South America—Railways.** *B. Pan American Union* 37 (1913): 165–191. **Reid.**

Railways of South America. By William A. Reid. *Map and Illustrations.*

**Tierra del Fuego—Historical.** **Roussel.**

Les Fuégiens, leurs moeurs et leur langage au XVII^me^ siècle. Par A. Roussel. (From the *Revue de Fribourg*, Décembre 1909.) Fribourg, 1909. Size 10 × 6½, pp. 14.

**Uruguay—Phytogeography.** **Gassner.**

*Vegetationsbilder* (*Karsten & Schenck*) **11** (1918): Plates 1–24.

Uruguay. Von G. Gassner. *Illustrations.*

## AUSTRALASIA AND PACIFIC ISLANDS.

**Easter Island.** **Churchill.**

Easter Island: the Rapanui speech and the peopling of South-East Polynesia. By William Churchill. (Carnegie Institution Publication, No. 174.) Washington, 1912. Size 10 × 7, pp. 340. *Purchased.*

**Melanesia.** **Williamson.**

The ways of the South Sea savage: a record of travel and observation amongst the savages of the Solomon Islands and primitive coast and mountain peoples of New Guinea. By Robert W. Williamson. London: Seeley, Service & Co., 1914. Size 9 × 5½, pp. 308. *Map and Illustrations. Price* 16*s. net. Presented by the Publishers.*

**New Guinea—Papua.** **Newton.**

In far New Guinea: a stirring record of work and observation amongst the people of New Guinea, with a description of their manners, customs, and religions. By Henry Newton. London: Seeley, Service & Co., 1914. Size 9 × 5½, pp. ix. and 304. *Map and Illustrations. Price* 16*s. net. Presented by the Publishers.*

**Pacific—Ethnography.** **Churchill.**

The Polynesian wanderings: tracks of the migration deduced from an examination of the Proto-Samoan content of Efaté and other languages of Melanesia. By William Churchill. (Carnegie Institution Publication, No. 134.) Washington, 1911. Size 10 × 7, pp. viii. and 516. *Maps. Purchased.*

**Pacific Islands.** **Johnson.**

Through the South Seas with Jack London. By Martin Johnson. London: T. Werner Laurie, [1914]. Size 8½ × 5½, pp. xi. and 369. *Illustrations. Price* 10*s.* 6*d. net. Presented by the Publisher.*

**Tahiti—Historical.** **Corney.**

The quest and occupation of Tahiti by emissaries of Spain during the years 1772–1776, told in despatches and other contemporary documents. Translated . . . , with Notes and an Introduction, by Bolton Glanvill Corney. Vol. 1. (Works issued by the Hakluyt Society, Second Series, No. 32.) London, 1913. Size 9 × 6, pp. lxxxviii. and 363. *Illustrations and Facsimile Maps. Purchased.*

## POLAR REGIONS.

**Antarctic—Austrian Expedition.** *M. k.k. G. Ges. Wien* **56** (1913): 323–328. (Wilczek.)

Plan einer österreichischen Südpolarexpedition. (Vom Geh.-Rate Grafen Wilczek.)

**Antarctic—Zoogeography.** **Levick.**

Antarctic penguins: a study of their social habits. By Dr. G. Murray Levick. London: W. Heinemann, 1914. Size 8 × 6, pp. x. and 140. *Illustrations. Price* 6*s. net. Presented by the Publisher.*

## MATHEMATICAL GEOGRAPHY.

**Survey.** **Jordan and others.**

Handbuch der Vermessungskunde. Von Dr. W. Jordan; fortgesetzt von Dr. C. Reinhertz. Three vols. I. Band: Ausgleichungs-Rechnung. 6. Auflage, bearbeitet von Dr. O. Eggert (pp. xi., 596, and 21). II. Band: Feld- und Land-Messung. 7. Auflage. (By the same; pp. xvi., 911, and 47.) III. Band: Landes-Vermessung und Grundaufgaben der Erd-Messung. 5. Auflage, bearbeitet von Dr. C. Reinhertz (pp. viii., 678, and 72). Stuttgart: J. B. Metzler, 1907–1910. Size 9½ × 7. *Diagrams. Price* 80*s.*

## PHYSICAL AND BIOLOGICAL GEOGRAPHY.

**Earth History.** **Marriott.**

The change in the climate and its cause, giving the date of the last Ice Age, based on a recent astronomical discovery and geological research. By Major R. A. Marriott. London: E. Marlborough & Co., [1913]. Size 9½ × 6, pp. 94. *Diagram. Price* 1*s.* 6*d. Presented by the Publishers.*

**Geology.** **Leith.**
Structural geology. By C. K. Leith. London: Constable & Co., 1914. Size 9 × 6, pp. viii. and 169. *Sections and Illustrations. Price 6s. 6d. net. Presented by the Publishers.*

**Geology—Igneous Rocks.** **Daly.**
Igneous rocks and their origin. By Reginald Aldworth Daly. New York: (London: Hill Publishing Co.), 1914. Size 9½ × 6, pp. xxii. and 562. *Sketch-maps, Illustrations, and Sections. Price 17s. net. Presented by the Publishers.*

**Geophysics.** **Bjerknes and others.**
Dynamic meteorology and hydrography. By V. Bjerknes and various collaborators. 2 vols. (Carnegie Institution Publication, No. 88.) Washington, 1910–1911. Size 12 × 9½, pp. (vol. 1) 146, 36, and 22; (vol. 2) vii. and 175; (Appendix) pp. 30. *Sketch-maps and Diagrams; also separate Portfolio of Maps* (size 16½ × 23). *Purchased.*

**Ice.** *Z. Gletscherkunde* **7** (1913): 216–224. **Hess.**
Ueber die Plastizität des Eises. Von Hans Hess.

**Land Ice.** *Z. Gletscherkunde* **7** (1913): 209–215. **Nordenskjöld.**
Einige Probleme des Inlandeises. Von Otto Nordenskjöld.

**Limnology—Colour.** *Deuts. Rundschau G.* **35** (1912–13): 206–211. **Ammann.**
Zur Bedeutung der Farbe des Seewassers. Von Dr. Hans Ammann.

**Limnology—Temperature.** *Ann. Hydrographie* **41** (1913): 511–513. **Rózsa.**
Ueber die periodische Entstehung doppelter Temperaturmaxima in den warmen Salzseen. Von Michael Rózsa. *Diagrams.*

**Meteorology—Circulation.** *Z. Ges. E. Berlin* 1913: 600–610. **Süring.**
Der jetzige Stand der Kenntnis vom Gesamtkreislauf der Atmosphäre. Von R. Süring. *Diagrams.*

**Oceanography.** **Brennecke.**
*Ann. Hydrographie* **39** (1911): 350–353, 464–471, 642–647; **40** (1912): 124–131.
Ozeanographische Arbeiten des Deutschen Antarktischen Expedition. Reiseberichte von Dr. W. Brennecke. *Sketch-map and Diagrams.*

**Oceanography—Atlantic.** *Rev. Hydrobiologie, etc.* **5** (1913): 513–539. **Pettersson.**
Einige Bemerkungen zu G. Schotts 'Geographie des Atlantischen Ozeans.' Von O. Pettersson. *Diagrams.*

**Oceanography—Ice.** *Ann. Hydrographie* **41** (1913): 414–417. **Baschin.**
Die Beeinflussung der Temperatur des Meerwassers durch die Nachbarschaft von Eisbergen. Von Otto Baschin.

**Oceanography—Mediterranean.** **Krebs.**
*Deuts. Rundschau G.* **35** (1912–13): 167–169, 193–198, 248–251.
Das Ionische Meer als eines der wichtigsten Felder ozeanographischer Forschung. Von Wilhelm Krebs.

**Oceanography—Mediterranean.** *Ann. Hydrographie* **41** (1913): 555–561. **Wegemann.**
Die Gezeiten des Mittelmeeres. Von Dr. Wegemann. *Sketch-map.*

**Oceanography—North Sea.** **Keller.**
*Ann. Hydrographie* **40** (1912): 513–524, 592–608, 671–677.
Die hydrographischen Verhältnisse der Nordsee in den Monaten Februar, Mai, August und November. Von Dr. H. Keller. *Diagrams.*

**Oceanography—Salinity.** *Ann. Hydrographie* **40** (1912): 303–310. **Löwe.**
Die optische Bestimmung des Salzgehalts im Seewasser. Von Dr. F. Löwe. *Diagrams.*

**Oceanography—Southern Ocean.** *Ann. Hydrographie* **41** (1913): 134–144. **Brennecke.**
Ozeanographische Arbeiten der Deutschen Antarktischen Expedition. (Die Eisfahrt.) 5. Bericht von Dr. W. Brennecke. *Charts.*

**Oceanography—Temperature.** *Ann. Hydrographie* **40** (1912): 74–97. **Eylert.**
Die Oberflächentemperaturen im südlichen Atlantischen und im südöstlichen Stillen Ozean zur Zeit der Polarforschung 1901 bis 1903. Von Theodor Eylert. *Maps and Diagrams.*

**Physical Geography.** *M.G. Ges. Hamburg* **27** (1913): 119–151. **Passarge.**
Physiogeographie und Vergleichende Landschaftsgeographie. Von S. Passarge. *Sketch-maps.*
The author illustrates his argument by a detailed consideration of South Africa.

**Physical Geography—Experiment.** *Petermanns M.* **59** (1913): II. 1–2. **Sapper.**
Das Experiment in der physikalischen Geographie. Von Prof. Dr. Karl Sapper.

**Seismology.** *Petermanns M.* **59** (1913): II. 182–185, 249–252. **Rudolph and Szirtes.**
Nomographische Bestimmung der Epizentrums. Von Prof. Dr. Emil Rudolph und Dr. Siegmund Szirtes. *Diagrams.*

**Tides—Mediterranean.** *Sitzb. K.A.W. Wien*, Abt. IIa. **122** (1913): 299–364. **Sterneck.**
Zur Theorie der Gezeiten des Mittelmeeres. Von Dr. Robert v. Sterneck. *Sketch-map.*

**Zoogeography.** *G.Z.* **19** (1913): 241–259, 335–345, 445–460, 498–513. **Hesse.**
Die ökologischen Grundlagen der Tierverbreitung. Von Richard Hesse.

## ANTHROPOGEOGRAPHY AND HISTORICAL GEOGRAPHY.

**Historical—Amber.** *Weltverkehr u. Weltwirtschaft* **3** (1913): 177–181. **Beckers.**
Die Bernsteinwege der Altertums. Von Dr. W. J. Beckers.

**History of Cartography.** *M. k.k. G. Ges. Wien* **56** (1913): 417–422. **Dengel.**
Die Frage nach dem Autor der verschollenen "Mappa mundi" im Palazzo di Venezia in Rom aus dem Quattrocento. Von Dr. Philip Dengel.

**History of Commerce.** *Abh. k.k. Ges. Wien* **10** (1912): No. 1; pp. 114. **Friedmann.**
Der mittelalterliche Welthandel von Florenz in seiner geographischen Ausdehnung (nach der "Pratica della mercatura" des Balducci Pegolotti). Von Dr. Eduard Friedmann. *Sketch-maps. Also separate copy* (size 11 × 8).

**Physiology—Altitude Effects.** **Aggazzotti.**
*Atti R.A. Lincei, Rendiconti* (*sc. fisiche*) V.; **22** (1913): 85–92.
La respirazione cutanea in alta montagna. Del dott. Alberto Aggazzotti.

## BIOGRAPHY.

**Pennell.** **Pennell.**
Pennell of the Afghan frontier; the life of Theodore Leighton Pennell. By Alice M. Pennell. London: Seeley, Service & Co., 1914. Size 9 × 5½, pp. xvi. and 464. *Maps and Illustrations. Price* 10*s.* 6*d. net. Presented by the Publishers.*

## GENERAL.

**Bibliography.** [**Tweney.**]
Standard books: an annotated and classified guide to the best books in all departments of literature, with a copious index of subjects and biographical notes of authors. [General Editor, C. F. Tweney.] 4 vols. London: T. Nelson & Sons, [1910–1913]. Size 10½ × 7½, pp. (vol. 1) 992; (vol. 2) 620; (vol. 3) 746; (vol. 4) 655 [loose-leaf binding to allow addition of fresh pages]. *Index-maps. Price* 63*s.*

**Bibliography—Catalogue.** **Wright and Purnell.**
Catalogue of the London Library, St. James's Square, London. By C. T. Hagberg Wright and C. J. Purnell. 2 vols. London, 1914. Size 11 × 8, pp. (vol. 1) xii. and 1395; (vol. 2) vii. and 1339. *Presented by the London Library.*

**British Colonies—Surveys.** **Colonial Survey Committee.**
The surveys of British Africa, British Honduras, Ceylon, Cyprus, Fiji, Hong Kong, Jamaica, Malay States, and Trinidad. The Annual Report of the Colonial Survey Committee. 8th year, to March 31, 1913. (Colonial Reports—Annual, No. 775, 1913.) London, 1913. Size 9½ × 6, pp. 80. *Maps and Diagrams.*

**Dictionary.** **Skeat.**
An etymological dictionary of the English language. By the Rev. Walter W. Skeat. New edition. Oxford: Clarendon Press, 1910. Size 11½ × 8½, pp. xliv. and 780. *Price* 38*s. net.*

**Education—Appliances.** *G.Z.* **19** (1913): 640–646. **Richter.**
Der Kinematograph als Vermittler geographischer Bildung. Von Wilhelm Richter.

**Education in Italy.** *B.R.S.G. Italiana* V, 2 (1913): II. 953–961. **Michieli.**

Per una maggiore conoscenza del nostro paese e l'apprendimento razionale della geografia. Del prof. Adriano Augusto Michieli.

**Geographical Congresses.** *Petermanns M.* 59 (1913): II. 141–145, 257. ——

Die zukunftige Gestaltung der Internationalen Geographenkongresse. Meinungen und Vorschläge im Anschluss an die Ausführungen von Prof. Dr. G. Braun.

**Geographical Society of Dresden.** *M.V.E. Dresden* 2 (1913): 623–656. ——

Festbericht. Das fünfzigjährige Jubiläum des Vereins für Erdkunde zu Dresden. *Illustrations and Diagram.*

**Geography.** **Wetherill.**

The Oxford Geographies; edited by A. J. Herbertson. The world and its discovery; a description of the continents outside Europe based on the stories of their explorers. By H. B. Wetherill. Oxford: Clarendon Press, 1914. Size 8 × 5, pp. 320. *Sketch-maps. Price* 3*s.* 6*d. Presented by the Publishers.*

**Photography—Diary.** **Wellcome.**

The Wellcome Photographic Exposure Record and Diary, 1914. London: Burroughs, Wellcome & Co. Size 5½ × 3, pp. 280. *Illustrations. Presented by the Publishers.*

**Voyages.** **Voss.**

Venturesome voyages of Captain Voss. By Captain J. C. Voss. Yokohama: Japan Herald Press, 1913. Size 9 × 6, pp. xv. and 394. *Map and Illustrations. Presented by the Author.*

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Shows, by various colours and symbols, the distribution of the religious beliefs in Lower Austria before the Reformation.

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Railway Map of the British Isles. By John Bartholomew. Scale 1 : 1,203,840 or 1 inch to 19 stat. miles. Size 32 by 29 inches. Edinburgh : John Bartholomew & Co., [1914]. *Price* 2*s. net, mounted on cloth. Presented by the Publishers.*

A useful map, with railways and railway stations clearly shown in black upon a lightly printed outline, with counties coloured. Enlargements of six special districts are given as insets.

**British Isles—Ireland.** **Bartholomew.**

The Tourist's Map of Ireland. Reduced by permission from the Ordnance Survey. By John Bartholomew, F.R.G.S. Scale 1 : 633,600 or 1 inch to 10 stat. miles. Size 29 by 22 inches. Edinburgh : John Bartholomew & Co., [1914]. *Price* 2*s., mounted on cloth. Presented by the Publishers.*

**British Isles—Lake District.** **Bacon.**

Bacon's Motoring and Cycling Road Map of the Lake District. Scale 1 : 190,080 or 1 inch to 3 stat. miles. Size 20 by 16 inches. London : G. W. Bacon & Co., Ltd., [1914]. *Price* 6*d. net. Presented by the Publishers.*

**British Isles—Yorkshire.** **Railway Clearing House.**

Official Railway Map of the Yorkshire District. Scale 1 : 126,720 or 1 inch to 2 stat. miles. 2 sheets, each 22 by 40 inches. Prepared and published at the Railway Clearing House, London, 1914. *Price* 11*s.*

**Central Europe.** **K. u. K. Militärgeographisches Institut.**

Generalkarte von Mitteleuropa. Scale 1 : 200,000 or 1 inch to 3·2 stat. miles. Sheets (new editions) : 37°–41°, Durazzo ; 38°–41°, Elbasan. Size 22 by 17 inches. Vienna : K. u. K. Militärgeographisches Institute, 1913.

**Germany.** **Hedemann.**

Schnellzugskarte des Deutschen Reiches. Entworfen von Reg.-Ass. H. v. Hedemann. Auf Grundlage des Massstabes von 1 : 2,200,000 [1 inch to 34·7 stat. miles] (in den Gebieten intensivsten Verkehrs dessen Raumerfordernis entsprechend grösser). Size 19 by 24 inches. From *Petermanns Mitteilungen*, Jahrgang 1914, I. Tafel 9. Gotha : Justus Perthes, 1914. *Presented by Prof. Dr. H. Haack.*

Shows in bands of red lines of varying breadth the relative amount of traffic over the railways in Germany and adjacent countries.

**Iceland.** **Generalstabens Topografiske Afdeling, Copenhagen.**

Generalstabens Topografiske Kort over Island. Scale 1 : 50,000 or 1·3 inch to 1 stat. mile. Sheets : 3 N.V., Saudlauksdalur ; 13 N.A., S.V., Bardaströnd ; 23 N.A., N.V., Gufudalur ; 33 N.A., N.V., S.A., Ospakseyri ; 34 N.A., N.V., S.A., S.V., Laxárdalur ; 35 N.A., Nordurárdalur. Size 16 by 18 inches. Copenhagen ; Generalstabens Topografiske Afdeling, 1914. *Presented by the Chief of the Danish General Staff.*

**Portugal.** **Corpo do Estado Maior.**

Carta dos Arredores de Lisboa. Scale 1 : 20,000 or 3·16 inches to 1 stat. mile. Sheets : 51, Villar ; 58, Lourinhã. Size 20 by 17 inches. Lisbon : Corpo do Estado Maior, 1911–12.

**Russia.** **Ministry of Ways of Communication, St. Petersburg.**

Map of the Railways, Roads, and Waterways of European Russia. Scale 1 : 1,680,000 or 1 inch to 26·5 stat. miles. 9 sheets, each 27 by 23 inches. St. Petersburg : Ministry of Ways of Communications, 1913.

A new edition of an official map showing railways, roads, canals, navigable rivers, telegraphs, etc., corrected up to November 1, 1913. The map is printed in colours, and shows forests in green.

## ASIA.

**India.** **Surveyor-General of India.**

Maps published by the Survey of India during the quarter ending December 31, 1913. Degree Sheets, scale 1 inch to 4 miles, Bengal 79 K, 79 N (Provisional

Issue); Bengal and Bihar and Orissa, 72 P (Provisional Issue); Bihar and Orissa, 72 G (Provisional Issue), 72 K (Provisional Issue); Bombay, Central India and Central Provinces, 46 O (layered with shaded hills); India and China, 92 K (Provisional Issue); Nepal, Bihar and Orissa and United Provinces, 72 B (Provisional Issue); Punjab and North-West Frontier Province, 43 C (layered with shaded hills).—Standard sheets, scale 1 inch to 1 stat. mile; Assam 78–N 2, 78–N 7, 78–N 8, 78–N 12, 78–O 5, 78–O 6, 78–O 7, 78–O 9, 78–O 11; Bengal, 79–K 9; Berar, 56–E 9; Berar and Hyderabad, 56–E 5, 56–E 13; Bihar and Orissa, 72–G 7 (Preliminary edition), 72–L 15 (Preliminary edition), 72–P 3 (Preliminary edition), 72–P 5 (Preliminary edition), 72–P 7 (Preliminary edition), 73–F 4, 73–F 9, 73–F 11, 73–F 13, 73–F 14, 73–F 15, 73–F 16; Bombay, Madras, and Mysore, 48–K 9; Burma, 92–D 11, 92–D 12, 92–D 15, 92–D 16, 92–H 5, 92–H 9 and 13, 92–H 16, 94–E 2; Central India, 55–I 3, 55–I 4, 55–I 7; Central India and Central Provinces, 55–I 2, 55–I 8; Central India, United Provinces, and Central Provinces, 54–L 3; Central Provinces, 55–J 2, 55–J 6, 55–J 9, 55–J 13, 64–A 2; Coorg and Mysore, 48–P 15; Kashmir and Jammu, 43–J 3, 43–J 4, 43–J 8, 43–K 13; Madras, 48–K 15, 48–K 16, 48–L 13, 48–L 14, 58–B 4, 58–B 8, 58–C 13; Punjab, 44–I 3, 44–I 6, 44–I 8, 44–I 9, 44–I 12, 44–I 14, 44–M 2, 44–M 3, 44–M 4, 44–M 6, 44–M 9, 44–M 12, 44–M 14, 44–M 16; United Provinces, 53–L 9, 53–L 12, 53–L 13, 53–L 14, 53–L 14, 53–P 3, 54–M 2, 54–M 11, 63–A 6, 63–A 7, 63–A 8, 63–A 12, 63–E 1, 63–E 6, 63–E 7, 63–E 8. Calcutta: Map Record and Issue Office, 1913. *Presented by the Surveyor-General of India.*

**Malay Archipelago—Celebes.** **Wanner.**

Topographische Skizze aus dem Ostarm der Insel Celebes. Aufgenommen im Februar und März 1905 von Dr. G. Wanner. Scale 1 : 250,000 or 1 inch to 3·9 stat. miles. Size 16 by 15 inches. From *Petermanns Mitteilungen*, Jahrgang 1914, I. Tafel 16. Gotha: Justus Perthes, 1914. *Presented by Prof. Dr. H. Haack.*

This map accompanies Dr. J. Wanner's article upon his journey made nine years ago, and shows the author's routes and adjacent topography, with geological and other information.

## AFRICA.

**Africa.** **Dubois and Kergomard.**

Afrique Physique et Politique. Dressée sous la direction de MM. Marcel Dubois et J. G. Kergomard. Scale 1 : 6,000,000 or 1 inch to 94·69 stat. miles. 4 sheets, each 29 by 40 inches. Paris: Augustin Challamel, 1913.

A well-drawn general map, printed in colours, and containing a considerable amount of detailed information. Hills are shown in brown shading, and water blue. Although 1913 is given as the date, this is quite misleading, as in many respects the map is much out of date, especially as regards boundaries and territorial names. For instance, the boundaries of Nigeria are quite wrong, as is also the western Uganda boundary in the neighbourhood of Lake Edward and Mount Ruwenzori, where no attention has been paid to the recent rearrangement of the British, Belgian, and German territories. As regards territorial names, those of South Africa are given as they were before the union, and in other respects it is clear that the map requires a thorough revision if it is to be really useful as it deserves to be.

**Algeria.** **Service Géographique de l'Armée, Paris.**

Carte de l'Algérie. Scale 1 : 200,000 or 1 inch to 3·15 stat. miles. Sheets: 76, El Abiod Sidi Cheïkr; 77, Brézina. Size 12 by 19 inches. Paris: Service Géographique de l'Armée, 1913. *Price* 0.70 *fr. each sheet.*

**Cape of Good Hope.** **Geographical Section, General Staff.**

Africa. Scale 1 : 250,000 or 1 inch to 3·95 stat. miles. Sheet South H 35–A, Kimberley. Size 17 by 19 inches. Drawn and printed at the War Office, 1914. London Agents: E. Stanford, Ltd.; Sifton, Praed & Co.; T. Fisher Unwin. *Price* 1*s.* 6*d. net per sheet. Presented by the Director of Military Operations.*

**East Africa Protectorate.** **Geographical Section, General Staff.**

Africa. Scale 1 : 250,000 or 1 inch to 3·95 stat. miles. Sheets: (Provisional) North A 36–R, Sekerr; (Provisional) South A 37–V and W, Mackinnon Road-Malindi; South B 37–D, Mombasa. Size 17 by 19 inches. Printed at the War Office, 1914. London Agents: E. Stanford, Ltd.; Sifton, Praed & Co.; T. Fisher Unwin. *Price* 1*s.* 6*d. net each sheet. Presented by the Director of Military Operations.*

**Egypt.** **Egyptian Survey Dept.**

Topographical Map of Egypt. Scale 1 : 50,000 or 1·3 inch to 1 stat. mile. Second edition. Sheets: N.E. II.–I., Tûkh; N.W. VI.–II., Desûq; S.W. IX.–II., Samalût;

S.W. X.–II., Damaris; S.W..XIII.–II., Deirût; S.W. XIII.–II., Dashlût. Size 18 by 20 inches. Cairo: Survey Department, 1913. *Presented by the Director-General, Egyptian Survey Department.*

**Nigeria, Southern.** **Guggisberg.**

Africa. Scale 1 : 125,000 or 1·014 inch to 2 miles. Sheet North B 31–CIV., Meko, Southern Nigeria. 1st edition, revised to June 13, 1912. Size 18 by 18 inches. Published by the authority of Sir Frederick Lugard, G.C.M.G., C.B., D.S.O., Governor, under the direction of Major F. G. Guggisberg, C.M.G., R.E. Director of Surveys, Southern Nigeria, and Captain R. H. Row A., Deputy Director, Topographical Branch. Edinburgh: W. & A. K. ston, Ltd. *Price* 1*s.* 6*d. per sheet. Presented by the Publishers.*

**Rhodesia, Southern.** **Surveyor-General of Rhodesia.**

Map of Southern Rhodesia. Scale 1 : 316,800 or 1 inch to 5 stat. miles. Compiled and drawn in the Surveyor-General's Office, Salisbury, Rhodesia, 11 sheets. London: British South Africa Company, [1914]. *Price* £3. *Presented by the British South Africa Company.*

This is on a larger scale and is more complete than any other general map of Southern Rhodesia published up to the present . Its accuracy must necessarily vary considerably, for while the parts near the chains of geodetic triangulation leave nothing to be desired in this respe there are others that are still almost unexplored or only mapped from the ghest route traverses and sketches. In addition to topographical features the map shows townships, farms, mines, railways, native reserves, police camps, native commissioners' stations, mission stations, and district boundaries. Triangulation stations and boundary pillars are indicated by symbols, and heights are given by feet. Apart from the boundaries, which are in green, the map is printed in black only.

**Sahara.** **Banse.**

Der Stand der Erforschung der Libyschen Wüste und Tibestis Anfang 1914. Entworfen von Ewald Banse. Scale 1 : 7,500,000 or 1 inch to 118·37 stat. miles. Size 11 by 12 inches. From *Petermanns Mitteilungen*, Jahrgang 1914, I. Tafel 23. Gotha: Justus Perthes, 1914. *Presented by Prof. Dr. H. Haack.*

A general sketch-map of the Libyan Desert and adjacent regions showing principal routes of travellers and tracks, prepared to accompany the author's article on the present knowledge of the region published in the March number of *Petermanns Mitteilungen.*

**Senegal.** **Service Géographique de l'Afrique Occidendale Française.**

Carte au Senegal. Scale 1 : 100,000 or 1 inch to 1·6 stat. miles. Sheets: XIII. Fatick; XIV. Kaolack; XVII. Nioro. Size 25 by 20 inches. Paris: Service Géographique de l'Armée, 1912. *Price* 2 *fr. each sheet.*

This is a continuation of the map noticed in the *Geographical Journal* for January, 1906.

## AMERICA.

**Argentine Republic.** **Seckt.**

Vegetationskarten aus dem Nordwesten Argentiniens (Calchaquitäler und Puna de Atacama). Entworfen und gezeichnet von Dr. Hans Seckt. Scale 1 : 80,000 or 1 inch to 1·3 stat. miles. Size 13 by 19 inches. From *Petermanns Mitteilungen*, Jahrgang 1914, I. Tafel 17. Gotha: Justus Perthes, 1914. *Presented by Prof. Dr. H. Haack.*

**Canada.** **Dept. of Mines, Geological Survey.**

Geological Survey of Canada. Map 26A. Bathurst and vicinity, Gloucester County, New Brunswick: Topography. Map 27A. Bathurst and vicinity: Areal Geology. Scale 1 : 62,500 or 1·01 inch to 1 stat. mile. Size 30 by 14 inches. Ottawa: Department of Mines, Geological Survey, 1911. *Presented by the Department of Mines, Geological Survey, Ottawa.*

**Canada—British Columbia.** **Dept. of the Interior, Ottawa.**

Southern British Columbia. Scale 1 : 500,000 or 1 inch to 7·89 stat. miles. Map showing disposition of lands. Prepared under the direction of F. C. C. Lynch, Superintendent of Railway Lands. Fourth edition, corrected to January, 1914. Size 24 by 53 inches. Ottawa: Department of the Interior, 1914. *Presented by the Department of the Interior, Ottawa.*

**Canada—British Columbia.** **Weston and Longstaff.**

Topographical map of Alberni and district. Compiled and drawn by S. C. Weston from plans and information supplied by Captain F. V. Longstaff, F.R.G.S. Scale

1 : 63,360 or 1 inch to 1 stat. mile. Size 25 by 40 inches. Victoria, B.C.: Victoria Book and Stationery Co., [1914]. *Price* 2s. *Presented by Captain F. V. Longstaff.*

A photographic blue print enlarged from and based upon a manuscript copy of the Cowichan sheet of the Geological Survey of Canada; with special information concerning lands and properties, and other details obtained from the Land Department, Victoria, B.C. Contours are shown at 200-feet intervals. Although rough in appearance, the map will doubtless be useful to all those locally interested.

**United States.** **Rand, McNally & Co.**

The Rand-McNally Index County and Township Pocket Maps: New Hampshire, scale 1 : 480,000 or 1 inch to 7·5 stat. miles, 1913, size 26 by 19 inches; Connecticut and Rhode Island, scale 1 : 348,480 or 1 inch to 5·5 stat. miles, 1912, size 19 by 26 inches; South Carolina, scale 1 : 760,320 or 1 inch to 12 stat. miles, 1912, size 19 by 26 inches. Chicago and New York: Rand, McNally & Co. *Price* 25 *each.*

These are new editions.

## GENERAL.

**World.** **J. Johnston.**

Johnston's Land Form Pictures. I. Continental Islands. Size 18 by 26 inches. Edinburgh: W. & A. K. Johnston, Ltd., [1914]. *Price, mounted on cloth,* 1*s.* 8*d. each net. Presented by the Publishers.*

The first of a series of pictures and plans for teaching physical geography in schools. It gives an island group by means of a picture above and an outline plan of the same group below.

**World.** **Kiepert.**

Henrici Kiepert: Formae Orbis Antiqui. 36 Karten mit kritischem Text und Quellenangabe. Bearbeitet und herausgegeben von Richard Kiepert. XXIV. Germania altero p. Chr. n. saeculo. Size 22 by 17 inches. Berlin: Dietrich Reimer (Ernst Vohsen), 1914. *Price* 3*M. each sheet with text.*

Three maps on one sheet, with separate text in same cover giving sources of information consulted and material utilized.

**World.** **Kowarzik.**

Die Verbreitung der Wildschafe. Entworfen von Dr. Rud. Kowarzik. Scale 1 : 20,000,000 or 1 inch to 315·6 stat. miles. Size 13 by 16 inches. From *Petermanns Mitteilungen,* Jahrgang 1914, I. Tafel 15. Gotha: Justus Perthes, 1914. *Presented by Prof. Dr. H. Haack.*

This map, illustrating the distribution of wild sheep throughout Asia, Corsica, Sardinia and Western North America, accompanying an article by Dr. Rud. Kowarzik in the February number of *Petermanns Mitteilungen.*

**World.** **Philip.**

Philips' Chamber of Commerce Atlas. A Graphic Survey of the World's Trade, with a Commercial Compendium and Gazetteer Index. Second edition. Size 10 by 7 inches. London: George Philip & Son, Ltd., 1914. *Price* 6*s. net. Presented by the Publishers.*

The first edition of this atlas appeared two years ago, and was noticed in the *Geographical Journal* for January, 1912. In this second edition there is a decided improvement in the maps: Nos. 43 to 48, for instance, are much clearer owing to the fact that the colouring of the counties has been omitted. On No. 37 the principal wireless stations of the world have been added. Boundaries have been brought up to date, and the atlas contains a large amount of information presented in a graphic style that renders it interesting as well as instructive.

**World.** **Rudolph and Szirtes.**

Erdkarte in mittabstandstreuer Azimutalprojektion mit dem Mittelpunkt Strassburg. Erdkarte in mittabstandstreuer Azimutalprojektion mit dem Antipodenpunkt von Strassburg als Mittelpunkt. Berechnet und entworfen von Prof. Dr. Emil Rudolph und Dr. Siegmund Szirtes. Scale 1 : 38,000,000 or 1 inch to 599·7 stat. miles. Size 18 by 18 inches. From *Petermanns Mitteilungen,* Jahrgang 1914, I. Tafeln 27 u. 28. Gotha: Justus Perthes, 1914. *Presented by Prof. Dr. H. Haack.*

## CHARTS.

**Admiralty Charts.** **Hydrographic Department, Admiralty.**

Charts and Plans published by the Hydrographic Department, Admiralty, from March 1 to 28, 1914. *Presented by the Hydrographer, Admiralty.*

**New Charts**—No. 3682, China, Canton river: Kap sing mun to Boca Tigris: northern sheet, 3*s*. 1100, North-west Pacific ocean: Plans of islands south of Japan: Nishi-no shima, Chichi jima islands, Futami ko, Haha jima islands, Kita iwo jima, Iwo jima, 3*s*. **New Editions**—No. 2585, British Islands: England, coastguard map, 3*s*. 2586, British Islands: Scotland, coastguard map, 3*s*. 2587, British Islands: Ireland, coastguard map, 3*s*. 2682, England, west coast: Bristol channel—Nash point to New Passage (Plan: River Usk), 3*s*. 3580, Wales, west coast: Fishguard bay, 2*s*. 3729, Scotland, Orkney islands: Scapa Flow and approaches, northern sheet, 4*s*. 2593, North sea: Terschelling zeegat to Friesche zeegat, 4*s*. 169, Mediterranean, Sicily: Palermo bay (Plan: Port of Palermo), 3*s*. 157, Mediterranean, Italy: San Remo to Cape Cavallo (Plans: Sestri Levante, San Remo). New plan of Vado on this sheet. Plans added: Port Savona, Viareggio, 3*s*. 1434, Adriatic sea: Gulf of Trieste (Plan: Trieste harbour), 2*s*. 1617, Mediterranean, Asia Minor: Vourlah road, 2*s*. 3411, Africa, west coast:—Anchorages on the west coast of Africa: Rocktown Berebi anchorage, Grand Berebi anchorage, Sassandra anchorage, Port Bouet (Piekaninny Bassam). Plan of Garraway anchorage on this sheet erased, 2*s*. 3115, Africa, west coast: Forcados river entrance, Port Forcados, 3*s*. 655, India, west coast: Port of Bombay, 3*s*. 1394, Gulf of Siam: Plans on the east coast of the Malay peninsula: Entrance to Kuantan river, entrance to Pahang river, entrance to Rumpin river, Joara bay, 2*s*. 1763, China, east coast: Wên-chau port and approaches, 3*s*. 2432, Russian Tartary: Tumen Ula to Strelok bay, including Peter the Great bay (Plan: Expedition and Novgorod bays), Plan of Razboinik bay on this sheet erased, 3*s*. 2347, Japan: Nipon, Kiusiu and Shikoku, and part of the Korea, 3*s*. 3325, Japan, Inland sea: Channels between Neko seto and Mekari seto, 5*s*. 3126, Philippine Islands: Anchorages in the Philippine islands: Kasiguran bay, West Dilasak bay, Port Lampon, Port Alabat. Plan added: Port San Vicente, 2*s*. 2611, Eastern Archipelago: Amboina bay (Plans: Amboina road, Amboina coaling wharf), 2*s*. 2763, Australia, east coast: Coral sea and Great Barrier reefs, showing the inner and outer routes to Torres strait, Sheet 1, 5*s*. 2731, Australia, south coast: Geelong harbour, 3*s*. 2103, Gulf of Mexico: Laguna de Terminos, Western entrance, 2*s*. 3166, West Indies, Puerto Rico: Jobos harbour, 2*s*. 2410, Nova Scotia: Mars head to Shut in island, 3*s*. 2320, Nova Scotia: Approach to Halifax, 3*s*. 2915, Newfoundland: Bay Bulls to Placentia, 3*s*.

(*J. D. Potter, Agent.*)

**Atlantic, North.** — **U.S. Hydrographic Office.**

Pilot chart of the North Atlantic Ocean, March and April, 1914. Washington: U.S. Hydrographic Office, 1914. *Presented by the U.S. Hydrographic Office.*

**Atlantic, North, and Mediterranean.** — **Meteorological Office.**

Monthly Meteorological charts of the North Atlantic and Mediterranean, April, 1914. London: Meteorological Office, 1914. *Price 6d. each. Presented by the Meteorological Office.*

**Indian Ocean.** — **Meteorological Office.**

Monthly Meteorological charts of the Indian Ocean, April, 1914. London: Meteorological Office, 1914. *Price 6d. each. Presented by the Meteorological Office.*

**Indian Ocean.** — **U.S. Hydrographic Office.**

Pilot chart of the Indian Ocean, May, 1914. Washington: U.S. Hydrographic Office, 1914. *Presented by the U.S. Hydrographic Office.*

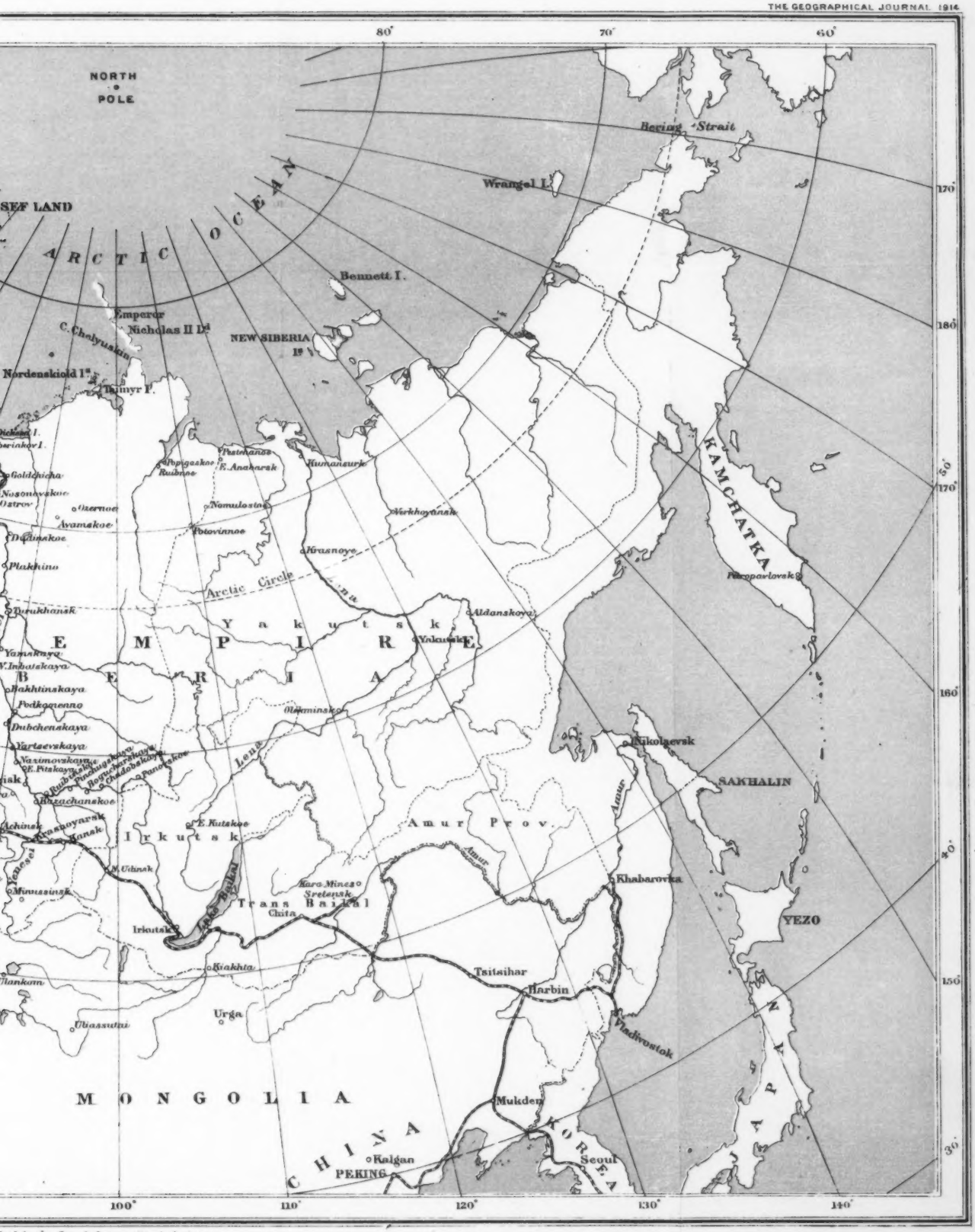
**Pacific, North.** — **U.S. Hydrographic Office.**

Pilot chart of the North Pacific Ocean, May, 1914. Washington: U.S. Hydrographic Office, 1914. *Presented by the U.S. Hydrographic Office.*

**N.B.—It would greatly add to the value of the collection of Photographs which have been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.**

Modified conical equal-area projection (Bonne's), with standard parallel 60° N.

Published by the




...hed by the Royal Geographical Society

THE SEA ROUTE TO SIBERIA
NANSEN & LIED

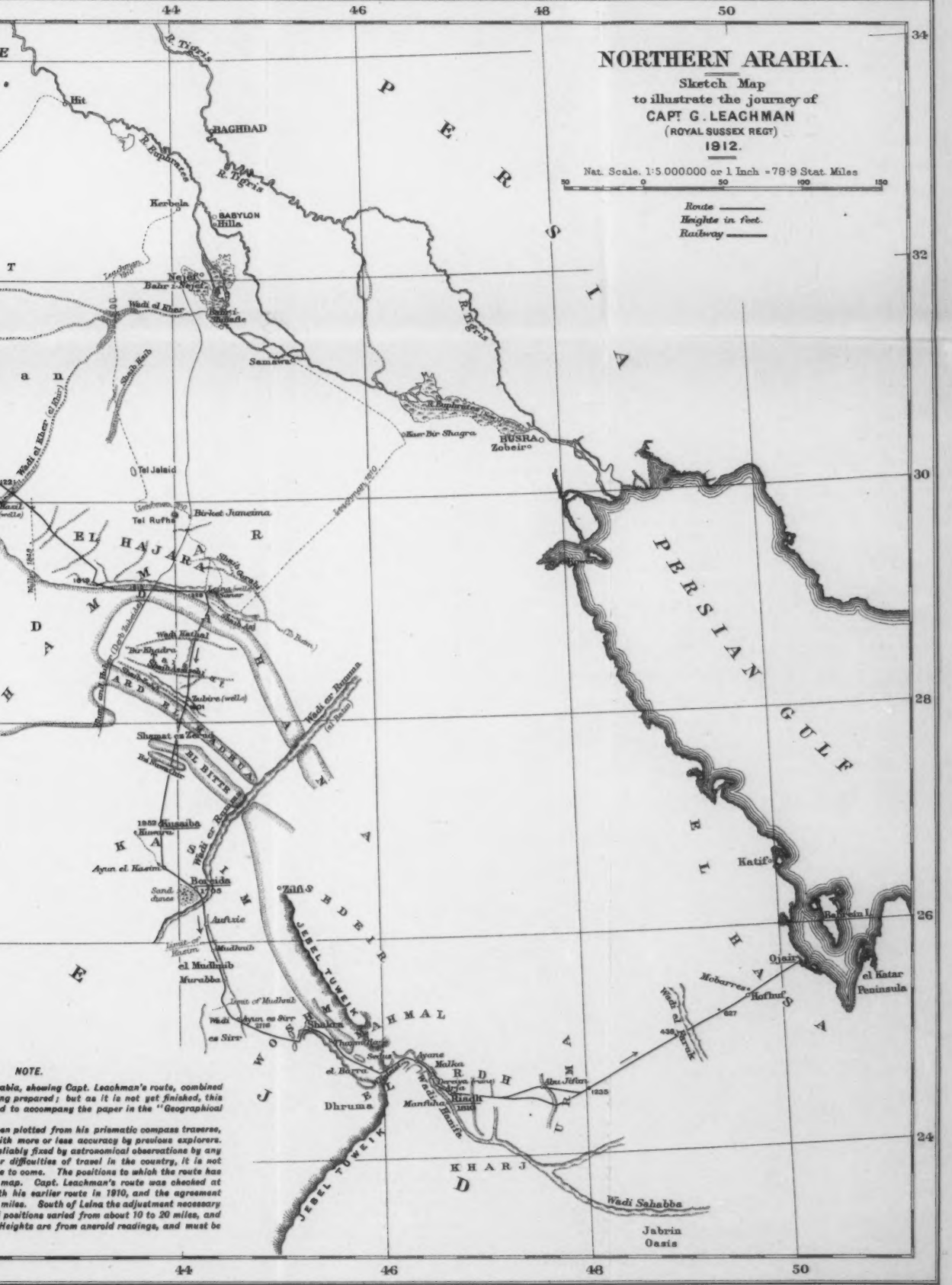
**NOTE.**

*A complete map of Northern Arabia, showi with those of other travellers, is being prepare provisional sketch has been published to accom Journal."*

*Capt. Leachman's route has been plotted adjusted to positions determined with more or No points in the interior have been reliably fixed traveller, and owing to the peculiar difficultie likely that they will be for some time to come. been adjusted are underlined on the map. Cap Leina, the point of intersection with his earli in distance was found to be within 3 miles. So to place the route on to the accepted positions more still in one or two instances. Heights are considered as only approximate.*

*Conical Projection with Errorless Meridians and Standard Parallels 25° and 33°.*

*Published by the Roy*




*the Royal Geographical Society*

**NORTHERN ARABIA**
Leachman.

19°
21°
22°
43°
42°
41°
Mitrovitza
Yarak
Shabatz
Save
Zimonie (Semlin)
BELGRADE
Panksova
Baraniste
Rubaritza
Rasharevatz
Smederevo
Lozanik
Makinata
Porodin
Zvilainatz
Yanya
Tsrna
Dekrish
Baniani
Zaplanka
Lazkevatz
Lazarevatz
Potanka
Valyevo
Drachilie
Mionitza
Arangyelovatz
Topola
Milanovatz
Dobrinia
Galitsha
Kragujevatz
Kniitsa
Pogodina
Preshnevitza
Krushevatz
Zhelin
Alexandrovatz
Rashka
Hasbunia
Blace
Novibazar
Kurshumlia
Prishtina
Ipek
Alshavik
Podgoritza
Cattinje
Bocche di Cattaro
Spizza
Postripa
SCUTARI
Vardina
Dulcigno
Shenko
San Giovanni di Medua
Drin Bay
Cape Rodoni
Cape Pata
Durazzo
Durazzo B.
Cape Laghi
Tirana
Elbassan
Kravasta Inlet
Okhrida
L. Okhrida
L. Prespa
MONASTIR (BITOLIA)
Kalkandelen
Uskub
Kachanik
Prisrend
Ipek
Trebinje
Ragusa
Castelnuovo
Spalato
Brut
Drin
Mati
Shkumbi
Devol
Semeni
Fogradec
Kortcha
Monastir
Krushevo
Prilip
Veles
Kotchani
Strumitza
Kavadar
Negotin
Orsova
Turnu Severin
Kladovo
Radujevatz
Petrovatz
Mehadia
Karansebes
Lugos
Temesvar
Arad
Szegedin
Csanad
Mako
Hatzfeld
Versetz
Pancsova
Semlin
Mitrovitza
Yarak
Shabatz
Save
Zimonie
Panksova
BELGRADE
Baraniste
Rubaritza
Rasharevatz
Smederevo
Lozanik
Makinata
Porodin
Zvilainatz
Yanya
Tsrna
Dekrish
Baniani
Zaplanka
Lazkevatz
Lazarevatz
Potanka
Valyevo
Drachilie
Mionitza
Arangyelovatz
Topola
Milanovatz
Dobrinia
Galitsha
Kragujevatz
Kniitsa
Pogodina
Preshnevitza
Krushevatz
Zhelin
Alexandrovatz
Rashka
Hasbunia
Blace
Novibazar
Kurshumlia
Prishtina
Ipek
Alshavik
Podgoritza
Cattinje
Bocche di Cattaro
Spizza
Postripa
SCUTARI
Vardina
Dulcigno
Shenko
San Giovanni di Medua
Drin Bay
Cape Rodoni
Cape Pata
Durazzo
Durazzo B.
Cape Laghi
Tirana
Elbassan
Kravasta Inlet
Okhrida
L. Okhrida
L. Prespa
MONASTIR (BITOLIA)
Kalkandelen
Uskub
Kachanik
Prisrend
Ipek
Trebinje
Ragusa
Castelnuovo
Spalato
Brut
Drin
Mati
Shkumbi
Devol
Semeni
Fogradec
Kortcha
Monastir
Krushevo
Prilip
Veles
Kotchani
Strumitza
Kavadar
Negotin
Orsova
Turnu Severin
Kladovo
Radujevatz
Petrovatz
Mehadia
Karansebes
Lugos
Temesvar
Arad
Szegedin
Csanad
Mako
Hatzfeld
Versetz
Pancsova
Semlin
ADRIATIC
MONTENEGRO
SERVIA
ALBANIA
BOSNIA

22°
23°
24°
25°
R. Danube
Turnu Severin
Orsova
Mehadia
Barias
Moldova
Sharevatz
Simitza
Hinova
Brosceni
Strehaia
Barbatesti
Filiashu
Tragashani
Slavitesti
Pitesti
Laurzeni
Ionesti
Tirgovist
R U M
Mototsi
Dranovatsu
Balsh
Slatina
Oltu (Alt)
Craiova
Danceu
Prahova
Negotin
Bukovitz
Zlatovo Mts.
Zagubitza
Lisats
Voinik
Zlotsa
Rogotin
Vidin
Calafat
Leul
Radomiral
Segarcea
Caracalu
Dragoneshti
Mihaesti
Roshiori de Vedi
Vedea
Sherbaneshti
Lada
Tatarest
Miroshi
Amarasti
Krushova
Manarel
Dabuleni
Bechetul
Rahovo
Sahinovo
Nikopol
Turnu Magurele
Lom Palanka
Sibritza
Ogosta
Isker
Pleven
Lovcha
Tetoven
Gabrovo
SHIPKA
Belogradjik
Berkhovitza
Vratza
Lukatnik
Tsaribrod
Pirot
Nish
Miromor
Prolaptie
Orliani
Zhitorogja
Turchumlia
Leskovatz
Golyak Mts.
Trevi
Dragoman Pass
Slivnitza
SOFIA
Bresnik
Vladaya
Radomir
Pernik
Vitosha Mt.
Iskar
Vrania
Pataritza
Zhelesho
Dragoman
Kumanovo
Egri Palanka
Kriva Reka
Kratovo
Jakub
Skopje
Kustendil
Dubnitza
Rilo Mts.
Rilo
Rilska
Rilska Reka
Samakov
Petrich
Malevitza
Musalla
Tatar Bazarjik
Maritza
Sirena
Eshekiaskar
PHILIPPOPOLIS
(Plovdiv)
Hajt Elia
Stanimaka
Peshtera
Batak
Tumarush
Rhodope Mts.
Peritza
SREDNA GORA
Rakhreni
Rhodope
Petrich
Gabarevo
Razlog
Bansko
Dospat
Dospat R.
Mesta
Karaferia
Xanthi
Bora Lake
Ravalla
Nigrita
Lake Langaza
Lake Tachinos
Strymonitza
Petrich
Demir Hissar
Seres
Hadzo
Serres
Strymon
Drama
Mustafa
Pasha
Kavadar
Rashtak
Rashtanska
Rashtanska Reka
Rashtanska Mts.
Rashtanska Mts.
Rashtanska Reka
Rashtanska Mts.
Rashtanska Reka
Rashtanska Mts.
Rashtanska Reka

25°
26°
27°
PLOESTI
Targovishte
Haimanale
Dobra
Maia
Urziceni
Gaesti
Ionesti
Ruska
Stefanesti
Tumadan
BUKHARES
Obilesti
Stoenesti
Tataresta
Miroshi
Pusni
Lada
Blejesch
Flataresti
Budesti
Barza
Calapasi
Draganesti
Daitsa
Tutrakan
DANUHE
Silistria
Alexandria
Giurgiu
Giurgevo
RUSCHUK
Turk Smil
Sienovo
Bielitza
Dzeferler
Junuslar
Eski Batabanlar
Basarbovo
Vietovo
Beli
Torlak
Razgrad
Sistova
Biela
Popovo
Novi Pazar
SHUMLA
Kyrdzhitso
Turnovo
Tirnova
Ruzitsa R.
Ebrevo
Elena
Gabrovo
Tvarditsa
Sliven
Karnabat
Yambol
Kermenli
Stara Zagora
Karagali
Chirpan
Haji Efes
Maritsa
Seimen
Stanimaka
Haskovo
Hermanli
Habibchevo
Kirjali Arda Su
Mustafa Pasha
ADRIANOPLE
Kirk
Goldzik
Gardahor
Kajlikikioi
Akalan
Kuru Dere
Kuleli Burgas
Karagach
Kartal Dagh
Kodja Vaila Dagh
Shakkane Dagh
Suru
Bunujina
Bora Lake
Port Lagos
Hermanli
Redoma
Fergjik
Ipsala
Keshan
Malgara
Le Gala
Dede Agach
Limni
Kavakli
Royalik
Eski
Baklaja
Ak Su
Karagach
Havsa
Baba Eski
Erkene Su
Hairabolu
Pasha Dere
Birgik Dere
Jeun Koupri
Geukjebu
Bashkioi
Magliora
Tchaush
Ak Su
Kara Su
Ludo Kamchia Su
Kishlakeui
Asmak D.
Kizil D.
Tundja Su
Maritsa
Sirena
Kara Agach
Kermenli
Tchaush
Ak Su
Kara Su
Ludo Kamchia Su
Kishlakeui
Asmak D.
Kizil D.
Tundja Su
Maritsa
Sirena
Kara Agach
Kermenli

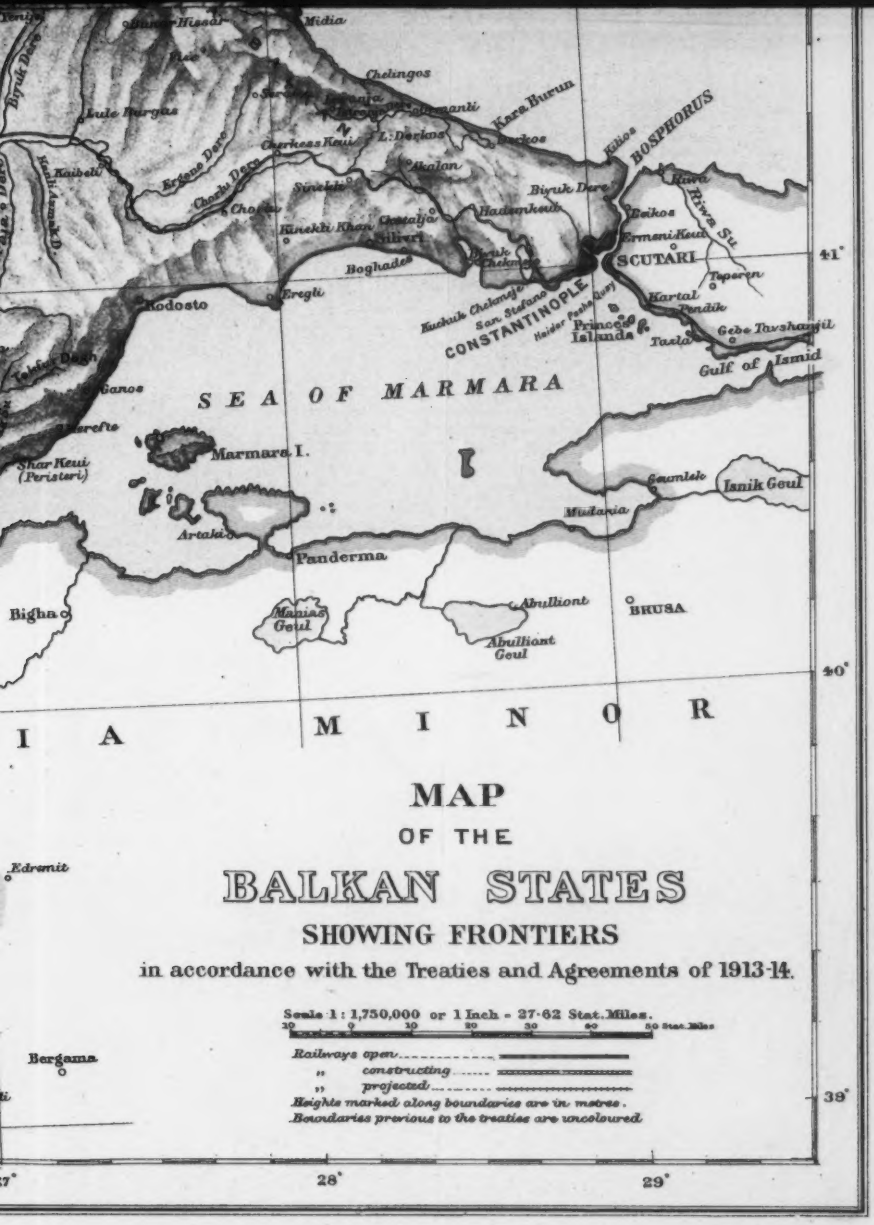
28°
29°
44°
43°
42°
41°
Babadag
Daeni
Rahman
Tiua Petri
Harsova
Tandara
Slobozia
Suditsi
Tari Verdi
Jegalia
Rasova
Medgidia
Constantza
(Kustendje)
Biulbiul
Ispritza
Tasla
Asarlak
Dobruja
Bairamdede
Beibunar
Azaplar
Hadzikeui
Mangalia
Kara Kadilar
Kili Kadi
Dobrich
Vladimirovo
Kadijevo
Semix Ali
Saridza
Karaorman
Mustafa Bela
Balchik
C. Kaliakra
Ekrene
Bel Monastir
Euxinograd
VARNA
Novosela
BLACK SEA
C. Emine
Mesemvriya
Gulf of Burgas
Burgas
Saxopol
Kara Agach
Vasiliko
Akhtebolu
Iniada Burnu
Sarakoi
Serbes Burnu
Midia
Kirk Bilissa
Hissar
Chelingos
Kara Burun
Bosphorus
Kilios
Derkos
L. Derkos
Kuru Su
Beikos
Ermeni Keui
SCUTARI
Topcrin
Kartal
Tenaik
Gebe Tavshanjil
Tuzla
Gulf of Ismid
Princes Islands
CONSTANTINOPLE
San Stefano
Eregli
Rodosto
SEA OF MARMARA

Conical Projection with Errorless Meridians and Standard Parallels 40° and 44°

22° 23° 24° 25°

*Published by the Royal Geographical Society.*

Kirjali
Arda Su
Kaja Baba Dagh
Kartal Dagh
Bord Lake
Porte Lagos
Dede Agach
Limni
Samothrace
Imbros
Kastron
LEMNOS
Tenedos
Cape Helles
DARDANELLES
Kum Kale
Besika Bay
Cape Suvla
Maidos
Chanak (Kale Sultanie)
GALLIPOLI
Gulf of Xeros
Gulf of Edremit
MYTILENE
Mivali
Edremit
Bigha
ASI
GEAN
SEA
25°
26°
27°




# MAP
## OF THE
# BALKAN STATES
## SHOWING FRONTIERS
in accordance with the Treaties and Agreements of 1913-14.

Scale 1 : 1,750,000 or 1 Inch = 27·62 Stat. Miles.

20 0 10 20 30 40 50 Stat. Miles

*Railways open*

*,, constructing*

*,, projected*

*Heights marked along boundaries are in metres.*

*Boundaries previous to the treaties are uncoloured.*